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PRESENT STATUS OF GLUCAGON

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ONE of the more significant of recent advances in endocrinology has been the recognition of the characteristics and functions of glucagon, the pancreatic "hyperglycemic-glycogenolytic factor." In spite of its importance in our understanding of metabolism (and diabetes) it has not achieved the fame of other hormones. This may be because its role as a therapeutic agent has not yet been defined. It may be safely predicted, however, that a substance so closely interrelated with insulin will find an important medical niche in the near future. This article is a brief review of the current status and unsolved problems of glucagon.

Within a year of the epochal discovery of insulin, Kimball and Murlin[1] and others[2,3] noted a brief but significant hyperglycemia following the intravenous administration of insulin. They postulated the existence of a "hyperglycemic factor" in the insulin preparation and suggested the name *glucagon*.[1] Most workers, however, believed that the hyperglycemia was part of the insulin effect. Attempts at isolation of this factor were unsuccessful and, in fact, when Abel and co-workers[4] prepared a crystalline insulin free of this action almost all interest in this "contaminant" was lost. Because attention was concentrated on insulin little attention was paid to the "contaminant" until 1934 when Scott[5] prepared crystalline insulin by a more practical method, but now the hyperglycemic effect *was* present.

This revived an interest in the problem and while physiologists were experimenting with various crude pancreatic extracts, chemists were trying to isolate this mysterious substance. Finally in 1953 Staub, Sinn, and Behrens[6] prepared crystalline glucagon.

Recent studies[7] have shown that this factor is a protein with a molecular weight of about 4,200, and contains approximately 30 amino acids in a polypeptide structure. Chemical analysis (table 1) shows its differences from insulin. It is not a "contaminant" or artifact, nor part of the insulin molecule. (Although generally

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considered to be a hormone, it has not fulfilled all the necessary criteria for this designation according to some writers.)

ORIGIN

There seems to be little doubt that glucagon is derived from the alpha cells of the islands of Langerhans in the pancreas. The

TABLE 1. *Differences in characteristics between glucagon and insulin (after Staub, Sinn, and Behrens[7])*

Characteristic	Insulin	Glucagon
Mol. wt. (approx.)	6,000	4,200
cystine	present	absent
proline	present	absent
isoleucine	present	absent
methionine	absent	present
tryptophan	absent	present
zinc	present	absent
alkali resistance	less	more
trypsin resistance	more	less

hyperglycemic-producing material is present not only in extracts of normal pancreas but also in extracts of pancreas from animals whose beta islet cells have been destroyed by alloxan.[8] In addition, damage to the alpha cells, by such compounds as cobaltous chloride, is said to reduce the amount of glucagon in the pancreas. The hyperglycemia following cobalt administration, however, seems to be independent of its effect on the alpha cells.[9] Strictly speaking, the alpha cell origin of glucagon has not been completely proved but the evidence is strongly suggestive.*

PHYSIOLOGIC ACTIVITY

A résumé of published observations indicates that glucagon activates an enzyme, phosphorylase, in the liver by accelerating its resynthesis. This is the enzyme which enhances the reaction:

$$\text{Glycogen and } \underset{\text{phosphate}}{\overset{\text{inorganic}}{\rightleftharpoons}} \text{ glucose - 1 - phosphate}$$

In short, glycogen is broken down (glycogenolysis) into glucose-phosphates which enter the body's metabolic pool. This reaction is measured by an increase in blood sugar.

Sutherland[11] observed that glucagon did not increase the blood lactate in animals. This is significant because when muscle glycogen is broken down the reaction swings to lactate which

*Interestingly enough, Kenny[10] has recently reported that no difference was found in the amount of extractable glucagon in the pancreas of diabetic and normal humans.

circulates in the blood to the liver, there to be used in many ways. The absence of a rise in lactate means that glucagon does not act on muscle glycogen. Epinephrine, which like glucagon causes hepatic glycogenolysis, does produce an elevation in lactate levels because it also acts on muscle glycogen. The lack of effect of glucagon on muscle glycogen has been shown to be true in humans also by Kirtley and associates.[12]

No toxic reactions have been noted after the chronic administration of large doses of glucagon to animals.[13] Diabetes was not produced. However, the liver glycogen concentration was significantly greater than in control animals. This is a surprising finding for a "glycogenolytic" agent and indicates that there are undoubtedly actions and interactions of glucagon which we do not understand.

Another curious finding is associated with the fact that corticotropin (ACTH) causes a marked increase in liver weight, due in large measure to an increased glycogen content. This might explain the finding that ACTH-treated animals show a heightened response to glucagon.[14] However, cortisone pretreatment did not lead to an enhanced blood sugar response to glucagon although the liver glycogen was also increased. Here, a rational explanation is sorely needed.

GLUCAGON-INSULIN INTERRELATIONS

Some confusion has arisen because of the claim that glucagon is an "anti-insulin" substance. The difficulty is a matter of definition. In that insulin lowers blood sugar and glucagon raises it (under certain conditions), the two may be called "antagonistic." There is a danger, however, of confusing one measurable resultant effect with a much more complex pattern of activity.

Recently, Anderson[15] has presented data which suggest that glucagon can increase or potentiate the trend of blood glucose *change*. That is, glucagon can raise or lower blood sugar depending on what is happening to the sugar at the time it is exposed to this hormone. The evidence for this, in my opinion, is not entirely convincing, but it is provocative because of its clinical implications. "Is the clinical diabetic individual one who has a perverted insulin-glucagon functional relationship? In these people, does insulin, intrinsic or extrinsic, in small 'catalytic' dosage have the functional effect of touching off an overresponsive intrinsic glucagon mechanism at a high level of blood glucose?"[15] The answer is not yet known.

Cross-circulation experiments in dogs would indicate a reciprocal arrangement between insulin and glucagon.[8] When the secretion of glucagon tends to raise the blood sugar level, insulin is secreted and lowers it; when too much insulin is secreted or in-

jected, its hypoglycemic effect is limited by the secretion of glucagon. These interesting findings do not necessarily prove any one conclusion and here again the final answer is not yet on hand.

GLUCAGON-PITUITARY RELATIONSHIP

Several observations seem to indicate that the anterior pituitary gland may stimulate the pancreas to produce glucagon. Among these are: (1) A hyperglycemic material is present in pancreatic (but not femoral) blood of animals treated with an anterior pituitary growth hormone preparation.[16] (2) A sharp increase in blood sugar in the hepatic vein and femoral artery of man is present 15 minutes after an intravenous injection of pituitary growth hormone.[17] (3) Recently a highly purified growth hormone preparation produced metabolic effects, such as low liver glycogen, ketosis, and high liver fat, strongly suggestive of the glycogenolytic-ketogenic effects of glucagon.[18] (4) Radioactive growth hormone tends to concentrate in the pancreas.[19] It is significant also that growth hormone was once known as the "diabetogenic" hormone of the pituitary. From these and other reports, therefore, it seems likely, at this writing, that the "somatotropic" (growth) hormone of the anterior pituitary can cause the secretion of glucagon. This immediately suggests clinical questions dealing with diabetes.

Does this explain the frequency of diabetes in acromegaly (growth hormone overactivity)?[20] Does this explain, in part, the amelioration of diabetes after hypophysectomy (Houssay phenomenon)? What therapeutic implications, if any, are buried here?

CLINICAL SIGNIFICANCE

At the present time there are no burning clinical indications for the use of glucagon. There is, however, a strong feeling that as the obscuring clouds lift, this hormone will find a place for itself in the practice of medicine.

Glucagon acts too transiently to be useful either in what is known as functional hypoglycemia, or in islet cell tumors. However, McQuarrie[21] described a syndrome of persistent hypoglycemia in children which appears to be familial and which is associated with a great reduction in alpha cells of the islets. This report noted that corticotropin was effective; however, glucagon was not administered.

Clearly the chief interest at present is the possible role of glucagon in the pathogenesis of diabetes mellitus. One challenging problem is the satisfactory explanation of the mechanism of the "stable" and "brittle" diabetes. The *stable* diabetic is usually obese, middle-aged, does not develop ketosis easily, is controlled by diet or relatively small doses of insulin, and can tolerate insulin withdrawal. The blood sugar in such a patient does

not fluctuate wildly. On the other end of the spectrum is the *brittle* or unstable (also known as "juvenile") diabetic. These patients are usually, but not always, young, thin subjects who show a remarkably wide variation in blood sugar, are sensitive to insulin, and prone to develop acidosis easily.

Kirtley and associates found a difference in metabolic response to glucagon in these two groups of patients. The stable diabetic had a greater and more prolonged rise in blood sugar than the unstable. These results were obtained in the fasting state and this explains why the results differ from those found by Pincus and Rutman[22] whose patients were fed and had their morning insulin dose. The height of the blood sugar response undoubtedly is related to the amount of liver glycogen[23] and one might conclude that the unstable diabetic has less glycogen in his liver.

Alivisatos and McCullagh[24] have recently reported that brittle diabetics had a greater rise in blood sugar level than stable diabetics or normal subjects. However, when glucagon was given *after* a dose of insulin there was but little change in blood sugar level. These authors considered various explanations and concluded that patients with brittle diabetes are more responsive to insulin than others and that "insulin comes into action forcefully increasing peripheral glucose utilization and decreasing the glucose output of the liver."[24] These results appear to conflict, in part, with both those of Kirtley et al. and Pincus and possibly can be explained by differences in experimental procedure or selection of patient. A question to be answered is: Is the "brittle" diabetic unstable because his liver lacks glycogen, or vice versa?

One of the intriguing aspects of glucagon metabolism concerns the fall in serum inorganic phosphate after both insulin and glucose administration in normal subjects. Presumably the phosphate falls because some of it is used to combine with glucose to form glucose-phosphates which then can enter cells. De Venanzi, Roche, and Vera[25] performed intravenous insulin tests in normal and diabetic subjects. They confirmed that the phosphate fall is reduced in diabetics as a whole although in some the fall was normal. They suggest that the normal response is probably due to the presence of insulin in these diabetic subjects. Therefore, the observations of Kirtley and associates that glucagon produced a significant fall in serum inorganic phosphate in normals and *unstable* diabetics (but not in the stable patient) are challenging. If the decline in phosphate levels is indicative of carbohydrate utilization, then glucagon may "improve" the metabolic status of the unstable diabetic. Clearly, more information is badly needed on this point.

Because minute amounts of glucagon may be present in commercially available insulin, one may suspect that it would "interfere" with insulin activity. However, there is less than 0.5 per cent of glucagon in insulin, and this amount in the usual insulin doses would clearly be without effect.[26, 27] In fact, addition of as much as 100 per cent by weight of glucagon to an insulin preparation free of glucagon had no effect on the mouse convulsion assay results used to determine insulin potency.[28]

Recently, glucagon was found to abolish gastric hunger contraction in normal subjects.[29] This was associated with a decrease in the sensation of hunger, a rise in blood sugar, and an increase in the peripheral capillary-venous blood sugar difference. The latter phenomenon is said to be related to satiety.[30] The interrelations of blood sugar changes with eating, the excretion of glucagon, and the phenomena of hunger and satiety are intriguing and worthy of extensive study.

There remain a few loose ends in the discussion of the clinical aspect of this curious hormone. It was logical to expect a glycogenolytic agent to be effective in glycogen storage (von Gierke's) disease. However, this has not turned out to be the case.[31] In addition, the relative rarity of ketosis in patients with diabetic glomerulosclerosis (Kimmelstiel-Wilson syndrome) has been suggested to be due to relative excess of glucagon.[32] There seems to be, however, some question regarding the premise that acidosis is infrequent in this disorder.[33]

To the physician who likes to have everything clean and simple, and arranged neatly in compartments, the present state of our knowledge of glucagon is eminently unsatisfactory. To the physician who appreciates the shadows for what they are—areas yet to be explored—glucagon offers a stimulating challenge in metabolic and endocrine fields.

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TREATMENT OF BURNS IN ATOMIC DISASTER

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UNDER conditions of mass disaster such as may be expected in nuclear warfare, thousands of casualties are produced. It is estimated that as many as 65 per cent of the surviving casualties will have experienced flash burns of varying extent and severity. Added to this large group will be those suffering burns produced by fires ignited by the fireball at the time of detonation or from broken gas and electric lines and overturned heating devices.

THE PROBLEM

Burns are one of man's most frequent and serious injuries and annually account for many deaths and many more disabilities. The economic loss to any nation in terms of man-hours is highly significant. Furthermore, it is common experience that when only four or five seriously burned patients are admitted to any hospital, an otherwise well-equipped and well-staffed organization finds itself severely taxed to properly meet the responsibility.

Because of these facts, research in this field is a continuing program universally to develop better methods of medical management of burn wounds and reduce the undesirable morbidity and mortality rates.

When great numbers of burns occur, it becomes apparent that if the best care possible for the most injured is the sound approach to the problem, certain compromises in therapy must be made and concentration on the ideal management of the few will not meet the challenge in a satisfying manner.

CURRENT CONCEPTS OF BURN THERAPY

Logically one reviews the current concepts of burn therapy and the studies being undertaken to perfect better methods in the approach to the problems involved in the medical management of thousands of burn casualties. The treatment of burns is considered from two approaches: (1) the systemic care of the patient, and (2) the local care of the burn wound.

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SYSTEMIC CARE

Systemic care takes precedence over local care, both as to time and importance, for it is the loss of the body fluid that kills, rather than the loss of skin and subcutaneous tissue. Immediately following burn injury there is a diminution of blood volume with loss of fluid into the interstitial spaces, as well as from the wound surface. These losses of colloids and electrolytes eventually cause peripheral circulatory collapse unless they are adequately replaced. It is now known that both blood and electrolyte solutions are required to reestablish a proper circulatory volume, though the exact ratio is yet to be determined. The best working guide should be the clinical response of the patient, supported by repeated laboratory studies. The volume of input required is determined by the urinary output which should be maintained at from 30 to 50 ml per hour. A comparatively simple formula has been widely accepted in the United States and, though generally applicable, is subject to modification according to the clinical progress being made by the individual patient (fig. 1).

The percentage of body surface burned is rapidly estimated by the equally popular "rule of nines" (fig. 2).

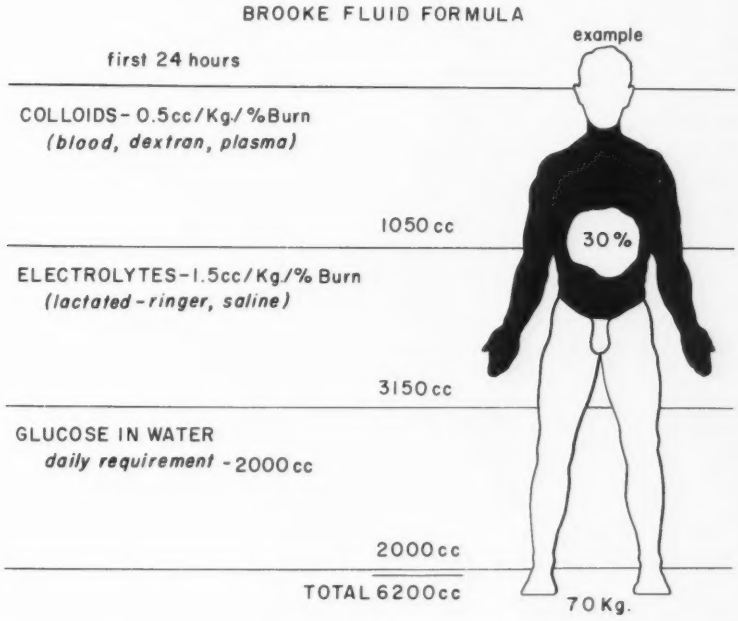

Figure 1. Formula used at Brooke Army Hospital for determining the fluid requirements of patients with burns during the first 24 hours.

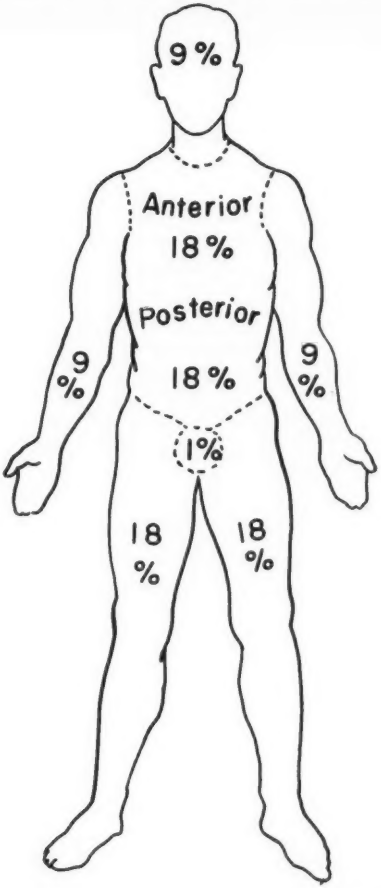

Figure 2. "Rule of nines," a method for estimating percentage of the body surface burned.

The fluid requirements for the second 24 hours are about one half the amount of colloids and electrolytes estimated for the first 24 hours, plus an additional two liters of glucose in water. After 48 hours, patients with moderate burns can usually be managed with an ad lib intake of water and food by mouth and with blood transfusions as required. The more severly burned patient who may be intolerant to oral feeding will require continued intravenous therapy.

Foreseeing the need of a temporary substitute for blood which may not be immediately available, several solutions have been studied and used as plasma volume expanders, the most popular being dextran. In an emergency they have been life sustaining until whole blood is available.

In less severely burned patients the use of an oral electrolyte solution is usually adequate. Such a solution is made by adding three grams of sodium chloride and one and one-half grams of sodium bicarbonate to a liter of cool water. This solution is usually well tolerated and provides sufficient replacement of electrolyte loss in patients with not more than 25 per cent body surface burn.

In addition to replacement solutions, other supportive therapy includes narcotics for pain, antitetanus prophylaxis, and antibiotics for the prevention of secondary infection. Penicillin and streptomycin are the antibiotics of choice, but a broad-sprectrum antibiotic may be required if these prove to be ineffective.

LOCAL CARE

Local care is carried out in one of two ways. For several years effective care has been obtained by covering the burned areas with petrolatum-impregnated, fine-mesh gauze supported by a bulky occlusive pressure dressing. More recently the open or exposed method has been reintroduced and has proved to be acceptable. This latter method is particularly applicable for burns of the face, perineum, and when only one side of the body has been burned. The aim of both methods is to protect the wound from invasive infection. In the latter instance this is accomplished by the dried coagulum which rapidly forms on the wound surface. These methods may complement one another, parts of the body being covered with a dressing and other regions exposed to the air. For ease of application, a bulky one-piece dressing has been devised in two sizes, one of which fits the arm and a larger one suitable for the leg or torso. When used, they are left in place for from five to seven days. Such dressings are now standard items in the United States Armed Forces.

The exposure method has two distinct disadvantages: (1) not all burns can be adequately exposed, such as large circumferential burns, and (2) moderate discomfort is present during the first 48 hours or until the coagulum is well dried. Likewise, the dressing method has certain disadvantages: (1) the application of dressings is time consuming and requires reasonable experience, (2) they are comparatively expensive, and (3) they require changing at regular intervals. Such changes are frequently painful and may require general anesthesia.

Regardless of the type of local care, less infection occurs if the wound surface is cleansed initially with soap and water, all blisters broken, and devitalized epithelium excised.

Early excision of the eschar of full-thickness burns and the immediate covering of such denuded areas with split-thickness skin grafts is a genuine advancement made in the care of burn patients. Convalescence is thus speeded, and in severe burns the degree of disabling inanition appreciably reduced. Easily mastered instruments for cutting such grafts have been perfected and the problems relating to the use of homografts and banking of skin for future use have been

thoroughly studied. The use of fresh cadaver skin is being carefully evaluated, for such a source may prove to be important in the care of masses of casualties.

Much has been accomplished in studies concerning the nutritional problems of severely burned patients. All eagerly await each new report of progress made.

MASS CASUALTIES

The primary aim in the management of masses of casualties must be to accomplish the greatest good for the greatest number. It is reasonable that during the first few days all supporting medical personnel will be engaged to the utmost. It is mandatory, therefore, that the greatest effort be directed to those casualties who may be expected to survive. Admittedly there are calculated risks in establishing priorities for care, and penalties for delayed treatment caused by the heavy load. Certain intelligent compromises in optimal care will be required.

TRIAGE OF PATIENTS

Unlike mechanical injuries, the burn injury lends itself to rapid estimation of the extent and severity. The severity of a burn wound is directly related to the volume of tissue burned. It is believed that the majority of burns in atomic disaster will be of the second degree, though it may be difficult in any individual person to determine the exact extent of second and third degree burning. Furthermore, many persons will have associated injuries. Thus, triage of patients becomes highly important, and for practical purposes four groups of burn casualties will be considered: (1) self-care burns, (2) moderate burns, (3) severe burns, and (4) overwhelming burns.

Self-care burns. This group comprises those with 10 per cent or less body surface burn and, unless hands or feet are involved, will require no immediate professional attention. It is believed that under conditions of atomic disaster a large percentage of persons with flash burns will fall within this group and must care for themselves or each other.

Moderate burns. This group will consist of those with from 10 to 20 per cent body surface burn, many of whom also will be required to care for themselves, whereas others will require professional guidance and eventually medical skill.

These first two groups will not be considered for early hospitalization, for the hospital beds must be reserved for patients needing more urgent care and lifesaving measures.

Severe burns. These will be those casualties with from 20 to 40 per cent body surface burns, many of whom will be in need of intravenous fluids and intolerant to fluids by mouth. All probably will need hospital care. Those with additional injuries may require priority in

treatment. Early organization of burn centers or sections within the hospital will be desirable. Special dressing rooms will be required; otherwise, within a few days such persons will be the source of severe contamination to the entire facility.

Overwhelming burns. The survival ratio of burns involving more than 40 per cent of the body surface, under ideal conditions, becomes progressively less with each increment of total area burned. Under conditions producing thousands of burns with limited personnel and supplies available to care for them, the mortality ratio may prove to be appalling. In many instances, efforts to resuscitate may be fruitless, and at best only those measures which will promote comfort will be possible. The age of the patient must be considered also, for neither the very young nor the very old tolerate burn injuries very well. Whereas none will be abandoned, it must be considered that many casualties will be hopelessly injured. As unsatisfactory as it may seem, this group will of necessity receive a low priority in the seemingly endless chain of care.

DEDUCTIONS

Admittedly, this rough classification is inadequate and fails to distinguish between second degree and third degree burns, which are more serious injuries. Nevertheless, two important deductions may be drawn: (1) Because of the enormous medical load suddenly created, many casualties must care for themselves and their neighbors who under normal conditions or in conventional warfare would be evacuated to hospitals; and (2) a smaller group are severely injured and a great percentage may not be expected to survive with the best care available. This latter group grows with the increase in volume of casualties, or with the decrease in professional personnel and needed material.

The first deduction points out the urgent necessity for re-evaluation by all nations of their training programs for civilian personnel and nonprofessional military personnel in first aid and emergency care. If self-care and "buddy-care" or neighbor-care are expected to play such an important role in the early hours of atomic disaster, such could be more effective with prior planning and a broad educational program of instruction in the principles of emergency care.

OTHER CONSIDERATIONS

There are additional problems in need of solution if a realistic attitude is assumed regarding the total medical responsibility. These may be divided into two groups: (1) organization and administration, and (2) casualty care.

It must be accepted that there will be losses of professional personnel in the disaster. Early mobilization of physicians from neighboring units and areas who, during the early hours of postbombing, will guide and direct the activities of many less trained persons ra-

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ther than actually performing the details themselves will be indicated. Sorting of casualties for priority in care, evacuation, hospitalization, and surgical treatment becomes an important responsibility and obligation. Leadership, teamwork, and the ability to improvise under the imposed limitations and adverse conditions are but a few of the subjects to consider before and not after the incident.

Under medical care, one must consider the problems of mobilization of reserve supplies and the necessity for simplicity in technical procedures required to provide care for the greatest number. The application of a bland ointment to all burned surfaces, with or without an incorporated antibiotic, as a simple solution to a difficult problem is in need of review. Certainly many patients can be made more comfortable by so doing. Whether or not hypodermoclysis should be used in lieu of intravenous therapy is another simple approach to be considered. The preparation of packets of salt and soda for electrolyte replacement would not be difficult, and the identification and general distribution of a broad-spectrum antibiotic for oral use merits investigation.

These are but a few of the problems considered to be in need of early study and decision. This responsibility is mutual to all, that the recommendations made be generally accepted, and policies, doctrines, and technics be the best for patient care wherever such care becomes necessary.

SUMMARY

In conclusion, one may state that the medical problems created by the incidence of large numbers of burn casualties present difficulties in need of thorough evaluation. The current concepts of medical management under ideal conditions are a distinct improvement over the past, but also present genuine deficits. Large numbers of burn patients overly tax our best facilities, and recent advances in therapy inadequately solve the problem. In atomic warfare capable of producing mass burn casualties, some sacrifices must be made in desired therapy and individual care in order that the medical effort may effectively serve the greatest number. Considering this workload and total responsibility, attention must be divided among the many. Therefore, many burns usually requiring professional attention must be diverted temporarily to allow lifesaving measures to others; some seriously burned must be classified as being fatally injured and receive supportive care only, whereas others will be judged to be in need of simple procedures of first aid and returned to duty. A known penalty in this approach to the total problem is accepted. However, the success of the medical effort will be measured by the survival rate and the capability of continuing the resistive effort and defeat of the opposing forces. Success in any military mission can be attained only by superiority in numbers of effective personnel capable of applying irresistible countermeasures.

INVESTIGATION OF VENEREAL DISEASE CONTACTS

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THIS ARTICLE describes the results of investigation of contacts reported in Massachusetts in 1954, by military personnel infected with venereal disease. The reduction of the infectious reservoir in the community, both military and civilian, occupies most of the venereal disease control officer's time. It includes finding the infected persons through screening tests; voluntary reporting, which is the fruit of education; and last but most important, discovering hitherto unknown cases through contact interviewing and immediate investigation. Modern treatment with penicillin and the other antibiotics rapidly reduces the infectiousness of these patients and, given adequate time and effective dosages, will cure. For example, with one injection of 360 mg. (600,000 units) of penicillin, acute gonorrhea is rendered noninfectious in about 2 hours or less, and the same injection will cure from 95 to 98 percent of all patients with acute infections in 24 hours. An early lesion of syphilis will be made noninfectious in 24 hours by a single injection of penicillin, and an 85 percent cure rate or higher can be expected with one course of treatment.

Decreasing the opportunity for exposure is principally the function of social protective agencies, although the health, recreational, religious, social, business, and other groups share a responsibility. Some of the medical responsibility is discharged through contact interviewing and investigation by eliciting the names and locations of sources of venereal disease, of evidence of prostitution, pandering and pimping, and of ascertaining those conditions considered inimical to the health, welfare, and morals of both military and civilian personnel. These data obtained by the responsible medical groups are made available to the social protective agencies for corrective action.[1] The names of individual patients and their contacts, however, are confidential medical information and are to be so treated. Their use beyond prescribed medical channels is forbidden not only by military regulations but also by State law.

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From Massachusetts Department of Public Health.

The control of venereal disease among military personnel is a joint function of both military and civilian authorities.[2] A military program aimed at the prevention and control of venereal diseases will be effective only to the degree of joint participation of the military and civilian partners. Each group must assume responsibility in certain areas, but the work of one must complement the efforts of the other. Failure of one of the partners to carry out his assigned tasks or failure to integrate the military and civilian responsibility will result in failure not only of the military venereal disease control program but the civilian as well.

Contact investigation in the armed services begins at the military installation with the infected serviceman who is being interviewed.[3,4] The results of contact investigations vary, other factors being equal, with the adequacy or inadequacy of the contact interview. Once the interview is completed, the information obtained is transcribed on the prescribed military epidemiologic report form (PHS-1421 VD) and sent to the appropriate civilian health authorities.

Who are the men in the armed services who contracted venereal disease in 1954 and named Massachusetts as "the place where their contact could most likely be found?" What are the characteristics of the civilian males who contracted and reported with gonorrhea that same year?

In 1954, there were 603 servicemen infected with venereal disease who named Massachusetts either as the place of encounter or exposure or both. Of these, 566 had gonorrhea, 20 had syphilis, 14 had chancroid, and 3 had granuloma inguinale. These military cases comprised about 20 percent of our total venereal disease problem.

About 60 percent of the military patients were white; 40 percent were Negro. About two thirds of the men were single and about 14 percent were married (table 1). These same proportions held roughly for both white and Negro. The widowed, divorced, and separated contributed slightly more than 2 percent of the series. The marital status of 17 percent of the military patients was not recorded.

These data are compared with a group of male civilian patients infected with gonorrhea from whom definite contact information has been obtained. In this group about 50 percent were single, 20 percent were married, 18 percent were separated, about 4 percent were divorced, and 1½ percent were widowed. Like the military patients, these same proportions held for both white and Negro.

TABLE 1. *Status of patients investigated in Massachusetts, 1954*

Marital status	White		Negro		Total	
	Patients	Percent	Patients	Percent	Patients	Percent
Military patients with venereal disease						
Single	237	66.2	162	66.1	399	66.2
Married	37	10.3	48	19.6	85	14.1
Widowed	1	0.3	-	-	1	0.2
Divorced	5	1.4	3	1.2	8	1.3
Separated	3	0.8	3	1.2	6	1.0
Not stated	75	21.0	29	11.9	104	17.2
Total	358	100.0	245	100.0	603	100.0
Male civilian patients with gonorrhea						
Single	142	53.2	225	47.7	367	49.7
Married	52	19.5	96	20.3	148	20.0
Widowed	5	1.9	6	1.3	11	1.5
Divorced	14	5.2	13	2.7	27	3.6
Separated	32	12.0	106	22.5	138	18.7
Not stated	22	8.2	26	5.5	48	6.5
Total	267	100.0	472	100.0	739	100.0

The average age of the military personnel infected with venereal disease was 23.0 years ± 2.9 years, and the average age of their contacts was 24.7 years ± 5.5 years (table 2). The mean age of both military patients and their contacts has not changed during the past 6 years in spite of the expansion of the armed services.

TABLE 2. *Average age of patients and their contacts*

Year	Military patients with venereal disease		Their contacts		Civilian male patients with gonorrhea		Their contacts	
	Age	Stand. deviat.	Age	Stand. deviat.	Age	Stand. deviat.	Age	Stand. deviat.
1949	23.4	3.9	24.3	4.7	30.2	6.5	26.6	6.0
1950	23.3	4.0	24.7	5.4	28.1	7.5	25.7	6.3
1951	23.4	3.4	24.5	4.5	28.9	7.3	26.7	5.9
1952	23.6	4.2	24.1	5.0	29.2	7.8	26.7	6.5
1953	22.9	3.8	23.8	4.4	29.3	7.8	26.5	6.4
1954	23.0	2.9	24.7	5.5	29.6	8.3	26.6	7.0

In contrast, the average age of the male civilian patients infected with gonorrhea was 29.6 years ± 8.3 years and the average age of his contact was 26.6 years ± 7.0 years. Like his military counterpart the average age of the civilian patient and his contact has not changed in the past 6 years.

However, when military patients and their civilian male counterparts are analyzed by single age groups from 18 to 29 years inclusive, in order to determine the average age of their female sexual partners, an interesting trend is observed. It was found that in general both the military and civilian patients followed a pattern of dating older girls up to the age of 24 and younger girls from the age of 25 and older. For both groups of patients in the age groups of 18 to 23 inclusive, it was found that the girls they named were apt to be one or more years older than the patients themselves, and at the age of 24 both groups of male patients would be apt to go out with girls about their own age, but both groups of men age 25 and older would most likely date girls 1 or more years younger than themselves.

There were 665 girls named as contacts of the 603 infected servicemen. What was the relationship of the female contacts to the military patients? Most of the girls (68.7 percent) were reported to be pickups, and 20.6 percent were said to be friends. The word "friends" should be in quotes because in most instances the serviceman did not know his friend's name. Therefore, it is our opinion that about two thirds or more of these so-called friends could be classified as pickups. Prostitutes were

named in 7.8 percent of the total series, and a homosexual was reported in one instance only (table 3). Thus, as can be seen in table 3, our problem in Massachusetts, like most areas of the country, centers about the pickup rather than the professional prostitute.

TABLE 3. *Relation of contacts to patients*

Contact	Military patients		Civilian patients	
	Number	Percent	Number	Percent
Pickup	457	68.7	495	54.6
Friend	137	20.6	256	28.2
Prostitute	52	7.8	42	4.6
Marital partner	18	2.7	104	11.5
Homosexual	1	0.2	10	1.1
Total	665	100.0	907	100.0

Examining the contacts of civilian patients with gonorrhea for the same period, it is found that about 55 percent were pickups, about 28 percent were friends, and prostitutes were named in 4.6 percent of the cases. Homosexual exposures were recorded in 10 instances.

How were the female contacts found? About 96 percent (table 4) of the military patients stated it was through their own efforts. Pandering was mentioned in less than 2 percent of the cases, thus confirming indirectly the absence of active, widespread, commercialized prostitution. Eighty-eight percent of the civilian patients stated that the contact was picked up through their own efforts, and pandering appeared in less than 0.5 percent of the cases.

Where did the encounter and exposure take place? About 60 percent of the female contacts were said to have been met in a restaurant, tavern, or bar. This is in contrast with the 40 percent mentioned for the place of pickup of the civilian patients. The contact's home was next in order of frequency for military contacts and this was mentioned by about 15 percent of the servicemen interviewed. Civilian patients named a home in about 25 percent of the times (table 5).

About one half of the exposures for military patients took place in a home, about one fifth in a hotel, and about another one fifth in an automobile (table 6). Slightly more than one half of the civilian patients reported exposure in a home, one sixth in an automobile, and about 6 percent in a hotel.

TABLE 4. *Method of procurement of contacts by patients*

Contact procured by	Military patients		Civilian patients	
	Number	Percent	Number	Percent
Self	639	96.1	799	88.1
Not applicable*	18	2.7	104	11.5
Pimp	7	1.1	–	–
Taxi driver	–	–	1	0.1
Bellhop	–	–	1	0.1
Other	1	0.1	2	0.2
Total	665	100.0	907	100.0

*Serviceman named wife as contact.

TABLE 5. *Places of encounter for infected patients*

Place of encounter	Military patients		Civilian patients	
	Number	Percent	Number	Percent
Restaurant, tavern, or bar	404	60.8	364	40.1
Home	97	14.6	231	25.5
Street	84	12.6	96	10.6
Not applicable*	18	2.7	104	11.5
Other	15	2.3	29	3.2
Dance hall	6	0.9	24	2.6
Beach or park	4	0.6	18	2.0
Bus or railroad station	4	0.6	3	0.3
Hotel	3	0.4	8	0.9
Brothel	3	0.4	–	–
Taxi	–	–	1	0.1
Not stated	27	4.1	29	3.2
Total	665	100.0	907	100.0

*Serviceman named wife as contact.

What type of contact information did the interviewer obtain and what were the results of the investigation of these contacts? (See table 7). Of the 665 names of contacts of military patients sent to us for investigation, about 30 percent were accompanied by complete information. With complete information, about 85

percent of the contacts were found and examined, whereas with incomplete information only about 48 percent of the contacts were located. For the civilian patients, complete contact information was elicited in slightly more than 41 percent of the cases. With complete information, 80 percent of the civilian contacts were found and examined, whereas with incomplete information only about 38 percent of the contacts were located.

TABLE 6. *Places of exposure for infected patients*

Place of exposure	Military patients		Civilian patients	
	Number	Percent	Number	Percent
Home	313	47.1	493	54.4
Automobile	142	21.3	146	16.1
Hotel	123	18.5	55	6.1
Rooming house	31	4.7	15	1.6
Not applicable*	18	2.7	104	11.5
Beach or park	6	0.9	16	1.8
Street	3	0.5	10	1.1
Taxi	3	0.5	3	0.3
Tourist camp	1	0.1	13	1.4
Brothel	1	0.1	1	0.1
Not stated	24	3.6	51	5.6
Total	665	100.0	907	100.0

*Serviceman named wife as contact.

Contact information is considered to be complete if there is furnished: her complete name and address, or her first and last name and telephone number, or her first name and telephone number, or her complete name and place of employment, or her complete name without the address if it is accompanied with the name and address of a friend or associate. Information is classified as complete on receipt of the contact data at our central office. In many instances on investigation it is found that the data furnished by the patient are erroneous or false. In spite of this, however, for statistical purposes the information is still coded as complete. Thus, for all contacts of military patients the staff was able to find about 59 percent of those named, and for civilian patients about 55 percent.

SUMMARY

More than 66 percent of the servicemen infected with venereal disease and naming contacts in Massachusetts were single and

TABLE 7. *Results of investigation of contacts named by military patients with venereal diseases and male civilian patients with gonorrhea, Massachusetts, 1954*

Results of investigation	Total number of contacts				Complete information on contacts				Incomplete information on contacts			
	Of military patients		Of civilian patients		Of military patients		Of civilian patients		Of military patients		Of civilian patients	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Number of contacts	665	100.0	907	100.0	206	100.0	375	100.0	459	100.0	532	100.0
Located and examined	392	58.9	501	55.2	174	84.5	301	80.3	218	47.5	200	37.6
Not infected	54	8.1	40	4.4	28	13.6	27	7.2	26	5.7	13	2.4
Infected	338	50.8	461	50.8	146	70.9	274	73.1	192	41.8	187	35.2
New case	112		158		53		108		59		50	
Treatment on suspicion	178		254		74		133		104		121	
Under treatment	3		47		3		31		–		16	
Previous treatment	45		2		16		2		29		–	
Not examined	273	41.1	406	44.8	32	15.5	74	19.7	241	52.5	332	62.4
Un-co-operative	2		8		2		1		–		7	
Cannot locate	210		293		28		69		182		224	
Insufficient information	58		90		1		2		57		88	
No reply	3		15		1		2		2		13	

14 percent were married. These same proportions held for both white and Negro personnel. In spite of the expansion of the armed services, the average age of the infected men and their contacts has not changed for the past 6 years; and in 1954, it was 23.0 years for the patient and 24.7 years for the contact.

For civilians we find the following: 49.7 percent of male patients infected with gonorrhea and naming contacts in Massachusetts were single and 20.0 percent were married. The average age of the patient was 29.6 years and the average age of his contact was 26.6 years. Like his military counterpart the average age of the civilian patient and his contact has not changed in the past 6 years.

The venereal disease control problem in Massachusetts centers about the pickup; the prostitute was reported in only 7.8 percent of the military cases and in 4.6 percent of the civilian male patients with gonorrhea. The taverns, bars, and restaurants are the focal point for most of the pickups; and the home, automobile, and hotel, in that descending order of frequency, remain as the places of exposures. This applies both to the military and civilian patients.

The results of the investigation, the number of girls who were located and examined, depend, other factors being equal, on the type of contact information supplied by the interviewer. In 1954, about 70 percent of the contact data were found to be incomplete on the military cases. Even with incomplete information, 48 percent of the contacts were located, and with complete information 85 percent of the female contacts were found and examined. Our over-all percentage of success was 59 percent.

Similar results were experienced with the civilian cases. It is obvious that much more time should be spent by the interviewer in his attempts to obtain contact information. Inadequate information on the initial interview indicates that the patient should be reinterviewed. On the success of the interviewer rests the fruits of contact investigation.

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THE DIFFICULT DUODENAL STUMP

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OFTEN the immediate success or failure of subtotal gastric resection of the Billroth II type or its modification for chronic duodenal ulcer depends upon the integrity of the closure of the duodenal stump. Most authors stress that the morbidity and mortality of subtotal gastric resection is largely due to complications resulting from insecure duodenal stump closure. Management of the difficult duodenal stump, therefore, is a problem that often presents itself in a surgical practice.

Statistics culled from the literature are somewhat misleading. They indicate that clinically evident duodenal stump dehiscence following gastric resection occurs in from 1.5 to 3.5 per cent of cases. However, these figures are from proved cases as evidenced by the presence of external bile fistula, by reoperation, or by necropsy. There are undoubtedly many more instances. Further, the case fatality rate from this disastrous complication is in the range of from 50 to 80 per cent, despite the use of antibiotics and supportive therapy. Tragically, most of these deaths occur in a productive, responsible age group.

The technical handling of the duodenal stump is made difficult by distortion of anatomic structures and by fibrosis, with or without edema, in the region of the first and second portions of the duodenum. The inciting mechanism is usually a posterior-wall, chronic duodenal ulcer penetrating into the pancreas, and there may be one or more adjacent chronic ulcers which further complicate the problem of safe handling of this stump.

There are, of course, all degrees of duodenal and periduodenal inflammation, fibrosis, and distortion, and success in management depends not only on many aspects of the definitive procedure, but also on identification and proper handling of the distorted anatomic structures and cognizance of the variations caused by recurrent inflammatory changes. Such appraisal is mandatory to avoid complications from closure of the duodenal stump. This can be facilitated by incising the peritoneum and the adhesions on either side of the second portion of the duodenum and elevating the duodenum beyond the ulcer by opening the hepato-

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duodenal and gastrohepatic ligaments. Thus the position of the common bile duct may be ascertained, the distance from the pyloris to the entrance of the common bile duct at the ampulla of Vater can be judged, and the degree of anatomic distortion will be more obvious.

If the degree of distortion and fibrosis is such that this maneuver is inadequate, the method of Lahey and Marshall,[1] who advocate choledochostomy and insertion of a probe or long T tube down through the ampulla of Vater, may be used. At this hospital we have not found this to be necessary but its merit for identification and, probably of equal importance, decompression of the duodenum in the region of the stump closure is recognized.

When exploration by this method is completed, the decision as to type of definitive procedure is made. One may elect to do an alternative procedure to gastric resection, such as (1) vagotomy and gastroenterostomy, which has its strong and convincing proponents; (2) a Bancroft plastic exclusion, which is declining in popularity because there are better alternatives or because of an unpleasant experience; or (3) a two-stage, subtotal gastric resection as advocated by McKittrick and associates.[2] The last-named procedure subjects a patient to two major operations, which I believe is unnecessary since some other method involving only one operation is usually adequate.

If the surgeon elects to proceed with a classic subtotal gastric resection, he accepts the responsibility of handling the difficult duodenal stump and is required to use some method of plastic closure, with or without choledochostomy, or a duodenostomy.

The problems associated with the difficult duodenal stump are caused by adhesions, fibrosis, with or without edema, and inflammation and distortion of anatomic structures due to the recurrent inflammation. As stated, this distortion is usually the result of a chronic posterior-wall duodenal ulcer penetrating into the pancreas, or by a chronic, penetrating, posterior-wall duodenal ulcer, with severe duodenitis or associated ulcer in some adjacent position.

The posterior and medial walls of the supra-ampullary portions of the duodenum are foreshortened and the ampulla, with its underlying main pancreatic duct and common bile duct, are much closer to the pyloris than the normal 8 to 10 centimeters. Also the orifice of the accessory pancreatic duct of Santorini, present in from 4 to 11 per cent of dissected specimens, if not obliterated by the chronic inflammation, may be as close as three cm to the pyloris and indeed adjacent to the ulcer. This anatomic distortion must be considered while dissecting posteriorly and medially to obtain sufficient cuff of duodenum to invert.

It is considered important to review the accepted theories for duodenal-stump leakage and to discuss each as it pertains to the difficult duodenal stump. These are: (1) obstruction in the afferent limb of the gastrojejunostomy; (2) inadequate blood supply to the duodenal stump; (3) precarious closure of the duodenal stump; (4) digestion at the suture line of closure of the duodenal stump; and (5) systemic factors affecting healing of the duodenal stump. Probably more than one of these factors is usually operative in causing duodenal-stump leakage.

OBSTRUCTION IN GASTROJEJUNOSTOMY

Obstruction in the afferent limb of the gastrojejunostomy is an important cause of duodenal-stump leakage and may occur at the level of the excluded ulcer low in the second portion of the duodenum; at the level of the afferent stoma of the gastrojejunostomy; at the level of the efferent stoma; or with inadequate decompression due to a poorly functioning nasogastric tube.

With a difficult or precarious stump closure which depends upon healing of already compromised tissue, the additional burden of increased intraluminal duodenal pressure may easily be disastrous. Multiple duodenal ulceration, especially when there is a low ulcer that has been obstructing, places extreme strain on the stump closure by increased intraluminal pressure. If such ulceration is present at the time of resection, some method of decompression proximal to the obstruction should be used. Careful technic in forming and placing the gastrojejunostomy is very important to prevent torsion or angulation of the afferent limb and to prevent turning in of too much tissue at the stomal angles. Careful technic also will prevent excessive trauma and may serve to minimize postoperative edema at these critical points.

A very satisfactory method of obviating obstruction in the afferent limb of the gastrojejunostomy is the use of the Abbott-Rawson double-lumen nasogastric tube, which can be threaded down the afferent limb for from 15 to 25 cm, past any obstruction or potential obstruction. When the tube is placed on suction, it will keep the afferent limb of the gastrojejunostomy and the stomach decompressed during the early critical period of healing. A side-on type of duodenostomy may also be used, and has been advocated by some when there is a precarious duodenal stump closure. If a Lahey-type dissection has been done, using a long T tube with a choledochostomy, the distal portion of the T tube lies in the duodenum at the ampulla of Vater and serves to decompress the duodenum and the afferent limb of the gastrojejunostomy. In my opinion this is the greatest advantage of this maneuver.

If a difficult and precarious closure of the duodenal stump, excluding an obstructing low ulcer, has been made, it would

probably be wise to use an end-type duodenostomy as popularized by Welch,[3] especially if the Abbott-Rawson tube cannot be threaded past the obstruction. Nissen[4] used side-to-side jejunojejunostomy to ensure decompression of the afferent limb. This, however, robs the main anastomosis of the stomach and jejunum of the benefit of the alkaline juices. The use of the efferent jejunostomy tube, threaded through the stomach and into the afferent limb, while effective, seems unnecessary when the Abbott-Rawson tube is available.

INADEQUATE BLOOD SUPPLY

Inadequate blood supply to the duodenal stump has probably caused many dehiscences because of necrosis at the suture line. The supra-ampullary portion of the duodenum receives its blood supply from right-angle perforating branches of the gastroduodenal, superior pancreaticoduodenal, and anastomotic branches of the inferior pancreaticoduodenal arteries. These vessels course along the contiguous surfaces of the duodenum and pancreas. Mobilization of a large cuff of duodenum interrupts many of these small perforating vessels and, since a portion of these may be occluded due to extensive inflammation and fibrosis, it is obvious that critically decreasing the blood supply to the stump area does not require too much posteromedial dissection.

Further, with the tension which may be necessary to invert the already compromised, inflamed, and fibrotic tissue of the proximal duodenum, embarrassment of the blood supply can easily be increased. Some surgeons have recommended completing the gastrojejunostomy before closing the mobilized stump in order to observe the tissue color for an adequate time. However it would seem superfluous to do this.

CLOSURE OF DUODENAL STUMP

Precarious closure of the duodenal stump is probably the one portion of the operation which worries most surgeons. Closure of the duodenal stump has been almost personalized, and each surgeon has found a method which seems to work best for him. Basically, a watertight closure is imperative, whatever the method of suture chosen. With ligneous tissue, heavily scarred, classic inversion is usually impossible if dangerously extensive posteromedial dissection is to be avoided. Therefore, a plastic method of turning the suture line of the duodenal stump into the pancreas above, at, or below the ulcer site is most satisfactory, using the more pliable anterior duodenal wall for rolling the stump in by suturing it to the capsule of the pancreas.

An open or closed method of stump closure may be used as dictated by the local anatomic situation. Posteromedial dissection through excessively scarred and inflamed tissue is facilitated

by keeping a finger in the lumen of the duodenum. Also the open method allows excellent visualization of the ulcer and the surrounding mucosa to aid in directing the method of closure. I do not believe that exteriorization of the ulcer is necessary, unless, perhaps, if it is obstructing the lumen below the closure; even so a decompression method is chosen rather than dissection in an area where damage to important structures is a dangerous possibility.

A modification of Nissen's[5] method of closure usually serves well when a large posterior ulcer and fibrotic, edematous, inflamed tissue are present. The duodenum is freed just proximal to or beyond the ulcer, whichever is possible and safe, and the open duodenum is closed with a continuous, basting, chromic No. 00 suture. If it is possible to invert this closure with another chromic No. 00 running suture, this is done, but often the inflexibility of the duodenal wall adjacent to the first suture line prohibits inversion. In this situation another running, over-and-over suture is placed in the stump end, providing the watertight closure. The suture line is then rolled snugly into the pancreas by suturing the seromuscular layer of the anterior duodenal wall to the capsule of the pancreas, buttressing it in snugly with two rows of interrupted silk sutures and making certain that there is no pouting at the angles. This suture line is then covered with a tag of omentum, again carefully covering the angle portions. The aim is to leave no dead space between suture lines, or between suture lines and the pancreas.

Good decompression and optimum nutrition are additional safeguards. A Penrose drain may be placed near the stump closure. This has proved effective in some cases but in others it has failed to prevent generalized peritonitis. In one series of over 250 gastric resections done at our hospital for chronic duodenal ulcer, using the method of closure described, the incidence of stump dehiscence was less than 0.8 per cent.[6]

Occasionally the tissues of the supra-ampullary portion of the duodenum are so ligneous and friable that any attempt at suturing is obviously impossible. This situation can be managed nicely by catheter duodenostomy. In this hospital we have used this method in 12 cases and have found it safe and relatively free of complications. The oldest patient was 92 and the youngest 32 years of age. All 12 had chronic posterior duodenal ulcer or ulcers with a severely deformed and fibrotic supra-ampullary portion of the duodenum, except one who had an annular pancreas with a greatly dilated, fibrotic, inflamed duodenum above the annulus.

In each case closure was deemed too precarious and, therefore, a No. 16 French red rubber or a No. 22 French latex rubber catheter, with multiple perforations in the intraluminal portion, was

inserted for a distance of 10 centimeters. The duodenal stump was closed as tightly as possible about the catheter and the end of the catheter was brought out through a stab wound in the right upper abdominal quadrant in whatever position the tube itself assumed. In some patients free omentum was tacked about the stump end and the tube while in others no omentum was used. It seemed to make no difference whether or not the omentum was used. A Penrose drain was placed in Morison's pouch. The duodenostomy tube was placed on gravity drainage and removed on the fourteenth to the twentieth day. The Penrose drain was removed on the fifth to the eighth day.

In no case has the resulting fistula failed to close rapidly. In only one case was a fluid and electrolyte problem created, and this was believed to be due to improper replacement of fluids in the postoperative period. All of these duodenostomies drained less than 800 ml in 24 hours. In one patient a sump drain was used for 24 hours after removing the tube because of excessive drainage and skin irritation. In this hospital we have not used the double jejunostomy as recommended by Welch and Rodkey[7] and have had no cause to regret it. However in a severely depleted patient the advantage of performing a jejunostomy for alimentation is worthy of consideration.

DIGESTION AT THE SUTURE LINE

Digestion at the suture line of closure of the duodenal stump with subsequent stump leakage has been reported many times. In this area of severe scarring, extensive dissection, especially into the pancreas, is extremely dangerous. As stated previously, the ampulla of Vater may be quite close to the ulcer bed because of foreshortening of the supra-ampullary portion of the duodenum due to the changes subsequent to recurrent chronic inflammation. Injury to the common bile duct or main pancreatic duct is then certain to be followed by enzymatic digestion and peritonitis with or without external fistula formation. Also, in a substantial number of cases the accessory duct may lie adjacent to the ulcer and may very easily be injured or opened, releasing digestive ferments which rapidly disrupt a suture line. Pancreatitis following trauma and ductule injury due to overzealous dissection in this area, with subsequent digestion at the duodenal stump closure, has been noted occasionally.

SYSTEMIC FACTORS AND HEALING

Systemic factors affecting healing of the duodenal stump are many. Any anemia, hypoproteinemia, or other state of malnutrition should be corrected prior to operation if possible in order to ensure maximum healing. In the cachectic patient with a precarious duodenal stump closure, probably the safest method to

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use is duodenostomy and complementary jejunostomy, accepting the care of a "controlled" fistula and providing a route for parenteral alimentation. Indeed it is this type of patient who "blows" the uninvolved duodenal stump. In the postoperative period the judicious use of fluids and electrolytes, especially sodium chloride, will guard against excessive edema in the traumatized tissues.

SUMMARY

Successful management of the difficult duodenal stump requires a thorough knowledge of the distorted anatomic structures in the region and a recognition of the pitfalls of overzealous dissection. A good watertight closure, adequately covered, decompression of the afferent limb of the gastrojejunostomy, and maintenance of an adequate blood supply are of paramount importance. Catheter duodenostomy is a safe alternative to precarious closure and, when the tissues of the duodenal stump defy any other type of handling, provides a sound method of dealing with the difficult duodenal stump.

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MULTIPLE BIRTHS

The rate for multiple births varies in different countries, and is higher in the Scandinavian countries, for example, than in the United States. Plural births are uncommon at the first parity, and for some reason or other are more numerous in the upper range of a woman's childbearing period. Thus in a total of 39 instances of quintuplets, the age of the mother was 35 to 40 years in 13.

—BORDEN S. VEEDER, M. D.
in Editor's Column, *Journal of Pediatrics*, p. 619, May 1955

DIVERTICULUM OF THE APPENDIX

H. CLINTON DAVIS, *Captain, MC, USAR*
TAUFICK E. BENDECK, *Captain, MC, USAR*
EDWARD A. HANSKE, *Captain, MC, USAR*

THE occurrence of appendiceal diverticula is more frequent than generally conceded, but their discovery is dependent on the effort made in searching for them during examination of the appendix. In a special study, Stout[1] was able to report five cases observed in one year. According to Ladin,[2] the incidence of diverticulum of the appendix varies between 0.08 per cent at the Army Institute of Pathology and 2.8 per cent reported by Mertens.[3] Our interest in the lesion was aroused by the seven appendiceal diverticula found in four patients in a period of two years at this hospital.

True diverticula contain all layers of the appendiceal wall, and are much less common than the false or acquired diverticula which usually lack muscularis. Most of the lesions are found in the distal half of the organ and are generally along the mesenteric border. Fullness of the mesoappendix should put the examiner on guard. Close serial sections from this area will often reveal the diverticulum (figs. 1-4). Division of the appendix along the antemesenteric edge for examination may render the ostium visible. In most instances the diverticulum will be involved in the over-all acute process, and a significant number of patients will show evidence of previous appendicitis.

Little is understood concerning the etiology of these diverticula. Unquestionably some of them are congenital, but these represent a minority. Experimental work by Stout showed that they could be produced by increasing the intraluminal pressure after injuring the wall, and particular emphasis was placed on the action of the muscularis layer. Previous mural weakening by a former attack of appendicitis could, therefore, create such a diverticulum with subsequent obstructive appendicitis. The more usual location on the mesenteric border would appear to be related to the natural weakened areas where the blood vessels enter the wall. The role of peristalsis and secretions during an episode of acute appendicitis is not clear. Yet both of these functions would seem to augment the factor of intraluminal pressure.

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Figure 1. Appendiceal diverticulum with a well-developed mucosal lining. The lesion is on the mesenteric side and the diverticulum is protruding along vascular channels. Appendectomy was performed for acute suppurative appendicitis. (× 8)

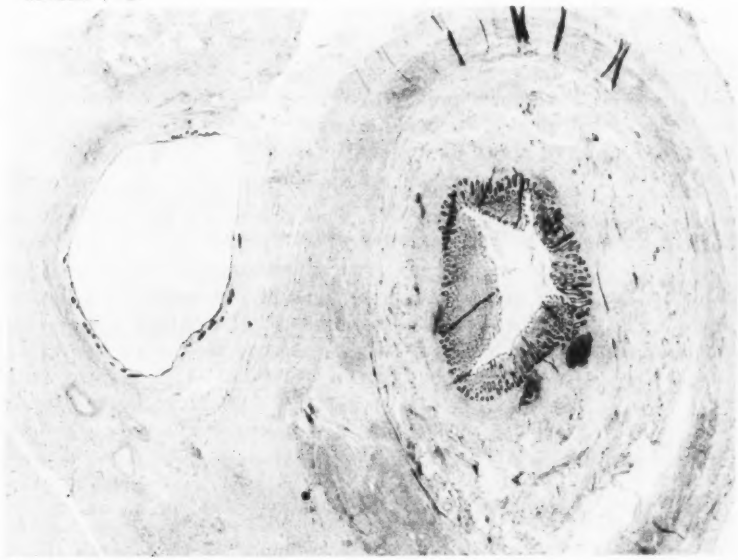

Figure 2. This mesenteric appendiceal diverticulum is lined with a single row of epithelium and is surrounded by fibrous tissue. The overlying acute inflammatory process is obvious. (× 8)

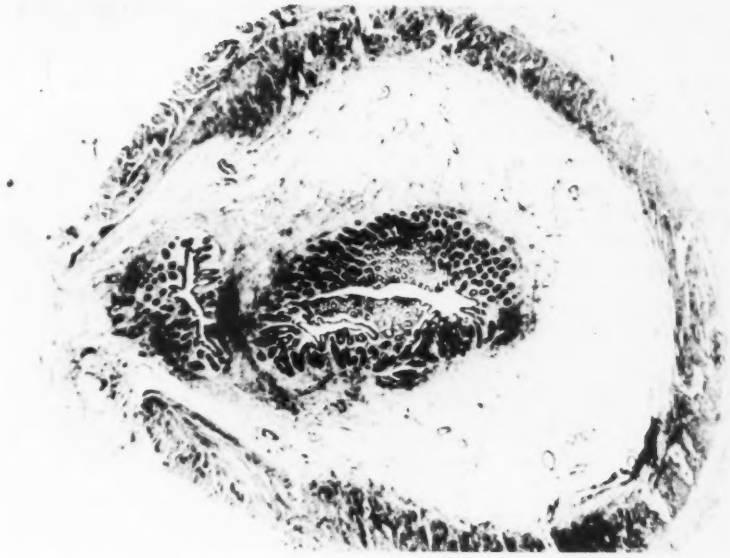

Figure 3. Diverticulum formation is seen here along the mesenteric border of the appendix. Note the lack of muscularis surrounding the diverticulum. (× 8)

Figure 4. Acute suppurative appendicitis with a fibromuscular wall around a diverticulum. (× 6)

Particularly noteworthy is the article by Wilson[4] which summarized the literature and the factors in the pathogenesis of acquired appendiceal diverticula: (1) Distention alone will not produce a diverticulum. (2) Stenosis of the appendiceal lumen is rarely ever complete but is frequently observed in the appendix proximal to the diverticulum. Such stenosis is suggestive of previous inflammation and is apt to be a developmental factor in the production of diverticula of the appendix. (3) The experimental work of both Stout and Wilson points to the importance of activity of the muscularis as a causative factor. (4) In 16 of the 18 appendices with extramuscular diverticula reported by Wilson, the diverticula passed out through vascular openings in the appendiceal wall.

DISCUSSION OF CASES

All patients in our series (table 1) had an appendectomy for acute appendicitis, and in each instance a severe inflammatory

TABLE 1

Patient	Age	Sex	Previous attacks	Duration of symptoms (days)	Pathologic finding
1	21	M	None	10	Acute suppurative appendicitis with diverticulitis of distal appendix
2	34	M	None	1½	Acute suppurative appendicitis distal two thirds of appendix with diverticulum along mesenteric border
3	25	M	None	1	Diverticulitis of the distal appendix. Two diverticula present
4	39	F	3 years before	4	Diverticulitis of appendix with three diverticula in distal two thirds of the appendix

process was present in the appendix. In each patient the distal half of the organ was involved, and all diverticula were located on the mesenteric border. A diverticulum was suspected by the surgeon in one case because of the thickened mesoappendix, but in the others the diverticula were found on gross examination by the pathologist. Multiple diverticula were found on two occasions. In only one case was a history suggestive of previous appendicitis obtained. Age and sex appeared to have no relationship. Three of the four cases in this small series were men; however,

approximately 10 men to 1 woman were operated on for acute appendicitis during the period of this study. Because these four cases represent a sample from a total of just over 400 consecutive appendectomies, our incidence of diverticulum of the appendix is approximately 1 per cent.

SUMMARY

Diverticula of the vermiform appendix are rather common. They are usually of the acquired variety and are most often located at the distal portion of the appendix on the mesenteric side. Appendiceal diverticulitis is an especially severe type of appendicitis.

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In general it is taken for granted that the doctor ought to do his best to help his patient, to relieve the sufferings—*i. e.*, he ought to be a good and helpful doctor. We all know the extreme case of this urge to help, the *furor therapeuticus*, against the dangers of which every experienced medical teacher should and does warn his students. On the other hand, very little has been written about the compelling need of certain patients to have a "bad," useless, therapeutically impotent doctor. The reason is that there are very few practitioners who can tolerate this role, and still fewer who can adapt themselves to it with their eyes open. The overwhelming majority of us, driven by our apostolic zeal, must do everything to impress our patients—and ourselves—that we are helpful, good doctors. These two opposing tendencies—the doctor's need to be helpful and the patient's need to prove that his doctor is no good—usually lead to strain.

—MICHAEL BALINT, M. D.
in *Lancet*
p. 686, Apr. 2, 1955

PANCREATIC CALCIFICATION

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LARRY J. HINES, *Lieutenant (MC) USN*
WILTON A. DOANE, *Lieutenant Commander (MC) USNR*

IN recent years calcification of the pancreas has firmly established itself as a disease entity. From 1 January 1948 through 31 August 1955, a period of seven years and eight months, 70 patients admitted to this hospital were found to have acute or chronic pancreatic disease. Twelve, or 17 per cent, had demonstrable calcification in the pancreas on roentgen examination of the abdomen. During this period there were a total of 197,406 hospital admissions.

Calcification is usually associated with advanced pancreatic disease. Even so, the diagnosis is frequently overlooked, to be discovered at exploratory laparotomy or at autopsy. Four, or 25 per cent, of our patients were explored either here or at other hospitals for that reason. Bullock and Edmundson[1] in studying 35,000 autopsies from 1925 to 1947 found 22 cases of pancreatic calcification, none of which had been diagnosed correctly by the clinicians.

The mechanism of calcium deposits in the pancreas is not entirely understood. Its deposition has been described as parenchymal or ductal. We believe that its deposition always begins in the ducts, and that the distribution may be diffuse in the smaller ducts or localized to the larger ducts. Edmundson, Bullock, and Mehl[2] in their able study discussed in detail the pathologic findings in and pathogenesis of pancreatic lithiasis. They noted that calcium salts were deposited only in the outflow tracts of the pancreatic juice and were never found in the interstitial tissues of the organ. They thought that the supersaturation of the pancreatic juice with calcium stasis, inflammation, and the accumulation of protein debris within the ducts all were factors in stone formation. Haggard and Kirtley[3] and Eliason and Welty[4] have pointed out that stones are chiefly calcium carbonate and calcium phosphate which are not normal constituents of pancreatic juice.

CLINICAL MATERIAL

This series of cases consisted of 10 men and 2 women (table 1). Three are of sufficient interest to be reported in more detail. The

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patients' ages ranged from 32 to 65 years with an average of 49. Eleven of the 12 were alcoholic, and 2 were addicted to narcotics. Three were diabetics and four others had a diabetic type of glucose tolerance curve. Three had steatorrhea and were nutritional problems. All but three had elevated serum amylase during attacks.

Associated diseases included duodenal ulcers, both of which had perforated previously, in two cases; one of these patients later had a gastrectomy for duodenal obstruction. One subject had gallstones removed, at which time chronic pancreatitis was diagnosed. One patient had cirrhosis, and one was found to have pulmonary tuberculosis while under treatment. The calcification was diagnosed as gallstones in one case, but at autopsy the head of the pancreas was full of stones; the gall bladder was found to be normal. All patients showed calcification on roentgenologic examination of the abdomen. All but one had recurrent attacks of abdominal pain at varying intervals and severity. Six patients had one or more abdominal operations.

Cases 9, 10, 11, and 12 (table 1) were treated by us. Two cases had direct surgical attack on the pancreas. Case 8 had exploratory laparotomy in the acute phase under a mistaken diagnosis. He has had no further hospitalization as far as we can ascertain. The seven remaining patients were treated medically; the condition of one was diagnosed at autopsy. Of the six cases remaining, all but one had symptoms of such severity that operation seemed indicated.

CASE REPORTS

Case 10. This 33-year-old naval officer was admitted to the hospital on 30 October 1952 with a diagnosis of duodenal ulcer. He had had a perforated ulcer repaired in 1950. He also gave a history of recurrent attacks of epigastric pain similar to the present episode. He was seen in consultation and a diagnosis of acute pancreatitis was made. His serum amylase was elevated to 840 units. Roentgenograms of the abdomen revealed multiple calcification interpreted as being in the pancreas. A gastro-intestinal series showed deformity of the duodenal cap without ulcer crater. He was treated conservatively and the attack subsided.

Because of a history of urinary calculi, his serum calcium and phosphorus were studied. Calcium values ranged from 13.8 to 16.5 mg and phosphorus from 2.6 to 4 mg, both per 100 ml. Alkaline phosphatase was 8.2 Bodansky units. A Sulkowitz test revealed a 2 and 3 plus calciuria. On a low calcium diet the urinary calcium was consistently elevated. Roentgen survey of the bones revealed no decalcification. A diagnosis of hyperparathyroidism was made on these findings.

Parathyroid exploration disclosed a 1.5 cm tumor at the left lower pole of the thyroid. The tumor was removed and histologically proved

TABLE 1

Case	Age	Sex	Diabetes	Addicted to		Steatorrhea	Elevated serum amylase	Pancreatic calcification	Recurrent pain	Previous surgery	Treatment	Remarks
				Narcotics	Alcohol							
1	40	M	No*	No	Yes	No	Yes	Yes	Yes	None	Medical	Duodenal ulcer diagnosed elsewhere; pancreatitis found here
2	54	M	No	No	Yes	No	Yes	Yes	Yes	None	Medical	Cirrhosis
3	61	M	No*	No	Yes	No	Yes	Yes	Yes	Explored in 1946; pancreatitis found	Medical	Preoperative diagnosis; perforated duodenal ulcer
4	39	F	Yes	No	Yes	Yes	No	Yes	Yes	Cholecystectomy in 1953; pancreatitis found	Medical	Severe nutritional cripple when first seen; pain never prominent
5	58	M	No	No	Yes	No	Yes	Yes	Yes	None	Medical	Admission diagnosis, cholecystitis; pancreatic calcification on x-ray; previous pancreatic pain
6	60	M	No	No	Yes	No	Yes	Yes	No	None	Medical	No other attack of pain

*Diabetic glucose tolerance curve

*Diabetic glucose tolerance curve

TABLE 1—Continued

Case	Age	Sex	Diabetes	Addicted to		Steatorrhea	Elevated serum amylase	Pancreatic calcification	Recurrent pain	Previous surgery	Treatment	Remarks
				Narcotics	Alcohol							
7	65	M	No	No	Yes	Yes	Not taken	Yes	Yes	For perforated ulcer	Subtotal gastrectomy for duodenal obstruction; died later of glomerulonephritis	Calcification in gall bladder on x-ray; in pancreas at autopsy, with normal gall bladder
8	52	M	No*	No	Yes	No	Yes	Yes	Yes	None	Explored; pancreatitis found	Discharged from Army in 1950 with diagnosis of cirrhosis; unconfirmed here
9	37	M	Yes	Yes	Yes	No	Yes	Yes	Yes	Explored in 1946; pancreatitis found	Left thoracolumbar sympathectomy	Improvement, but patient lost to follow-up. Also had tuberculosis
10	33	M	No	No	No	No	Yes	Yes	Yes	Perforated duodenal ulcer repaired in 1950	Parathyroid adenoma removed	Became asymptomatic; returned to duty. Lost to follow-up after 1 year

*Diabetic glucose tolerance curve

TABLE 1—Continued

Case	Age	Sex	Diabetes	Addicted to		Steatorrhea	Elevated serum amylase	Pancreatic calcification	Recurrent pain	Previous surgery	Treatment	Remarks
				Narcotics	Alcohol							
11	54	M	No*	No	Yes	Yes	No	Yes	Yes	Operation for carcinoma of tongue. No abdominal surgery	Pancreatolithotomy	Became asymptomatic; gained weight. Still had steatorrhea
12	32	F	Yes	Yes	Yes	No	Yes	Yes	Yes	Explored; pancreatitis found	Resection of tail of pancreas with caudal-pancreatojejuneostomy. Eventual total pancreatectomy	Stopped using narcotics and gained weight (see text)

*Diabetic glucose tolerance curve

to be a parathyroid adenoma, chief cell type. Postoperatively, the urinary calcium dropped to zero and early signs of tetany developed. Accordingly, he was treated with a high calcium and low phosphorus intake and dihydrotachysterol. On this therapy his calcium metabolism stabilized.

Comment. The relationship between the patient's hyperparathyroidism and pancreatic calcification is not entirely clear. Martin and Canseco[5] reported a similar case but made no correlation between the two conditions. The parathyroid tumor in their patient was found at autopsy. Serum calcium and phosphorus studies in 13 other cases in their series were essentially normal.

Because of the frequency of urinary calculi in this disease, as well as calcium imbalance in other tissues, it seems reasonable to assume that the pancreatic calcification may be another manifestation of hyperparathyroidism. The question will have to await further solution. If calcium and phosphorus metabolism were studied in all cases of pancreatic calcification, more cases of hyperparathyroidism might be discovered.

This patient was followed for about a year with no recurrence of his abdominal symptoms. His general health was greatly improved and he was discharged from the service.

Case 11. This 54-year-old retired naval officer was admitted to the naval hospital on 9 March 1953 complaining of recurrent diarrhea and mild epigastric pain of one year's duration. He had used alcohol to excess. His stools were light and bulky and there had been a gradual weight loss. He had been treated for carcinoma of the tongue in 1951 by radium implants followed by neck dissection in 1952.

The physical examination was that of a man chronically ill. No evidence of recurrent carcinoma could be demonstrated. Palpation of the abdomen disclosed a somewhat movable transverse mass in the upper abdomen. Roentgenograms of the abdomen revealed a broad band of the calcification traversing the abdomen in the position of the pancreas. A few flecks of calcium sprinkled the area. Pancreatic enzymes were present on duodenal drainage. The blood sugar was 175 mg per 100 ml three hours after sugar ingestion; serum amylase was low; cephalin-cholesterol flocculation was 2 plus. The stools contained undigested food particles and fatty acid crystals.

A laparotomy was performed on 25 May 1953. The pancreatic duct was markedly dilated and contained two large faceted stones (fig. 1) and many small jagged fragments. These were removed, after which a probe passed readily into the duodenum. The pancreas was somewhat atrophic and fibrotic. No other pathologic lesions were found.

A T tube was placed in the duct of Wirsung and the abdomen was closed. Postoperative convalescence was smooth and the T tube was removed without fistula formation. The patient left the hospital in good condition.

Comment. In this case the stones were primarily in the large pancreatic duct. Even though the organ was not completely obstructed it was felt that the partial obstruction should be relieved in order to improve the pancreatic deficiency state. The operation of pancreatolithotomy has limited usefulness but was indicated in this case.

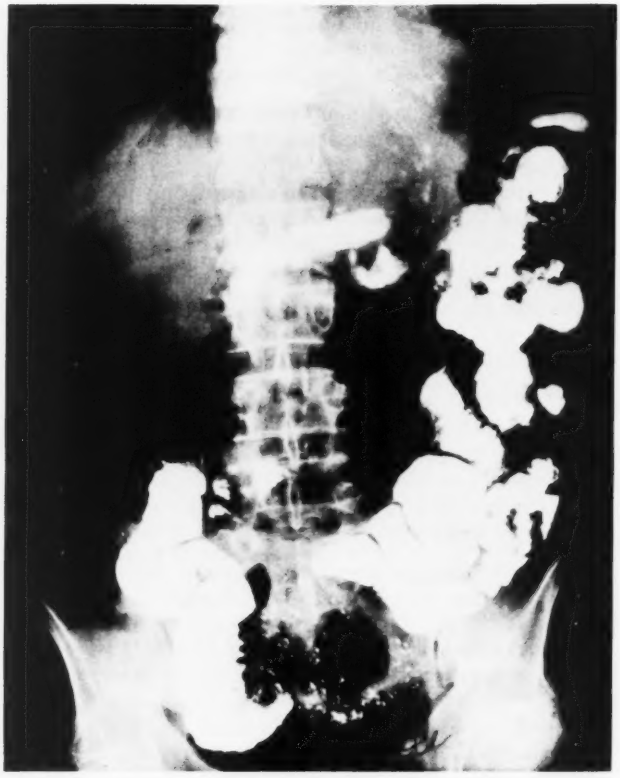

Figure 1 (case 11). Roentgenogram showing two large faceted stones in the main pancreatic duct lying across the second lumbar vertebra.

He was examined again in 1955 at which time he was asymptomatic and had gained six pounds in weight. Pancreatic calcium had not increased on roentgen examination.

Case 12. This 32-year-old woman was studied because of epigastric pain, having undergone exploratory laparotomy at another hospital in 1953. A biopsy specimen of the pancreas revealed chronic fibrosing pancreatitis. She had been a waitress for several years and had used

alcohol to excess. Her first admission to this hospital was in March 1954. She complained of recurring epigastric pain, nausea, and vomiting of a year's duration. Roentgenograms of her abdomen and gall bladder and a gastro-intestinal series were reported normal. She was admitted again in May 1954. Alcohol seemed to precipitate each attack and she was now becoming addicted to narcotics. A left splanchnic block gave definite pain relief, and on 24 June 1954 a left thoraco-dorsal sympathectomy was performed. She was readmitted in July and again in October 1954. On the latter admission, radiologic examination for the first time revealed definite stippling in the tail of the pancreas. In November 1954 a caudal pancreatectomy was done with a pancreatojejunostomy, using a Roux-Y-loop of jejunum. It was planned to do a sphincterotomy and dilatation of the ducts of Wirsung and Santorini at the same time. The idea was abandoned because of the severe edema of the duodenum and head of the pancreas. Convalescence was uneventful but results were difficult to evaluate because of narcotic addiction. We attempted to withdraw the drug and the patient signed herself out of the hospital in December 1954. Roentgenograms in January 1955 revealed progression of the calcification to involve the head of the gland. In the interim between January and April 1955 she was admitted to the local county hospital and treated unsuccessfully for narcotic addiction. She came back to us in April 1955, a diabetic, weighing 79 pounds and taking as much as 250 mg of demerol every four hours for pain. A large, palpable abdominal mass was present.

It now seemed obvious that total pancreatectomy was her only hope for relief. She gladly accepted the risk. In May 1955 total pancreatectomy was performed. The head of the pancreas was large, hard, and fibrotic. The common duct was not dilated. The duodenum and gall bladder were thickened and edematous; the gall bladder had lost its normal luster and contained no palpable stones. The liver edges were blunted. The spleen was enlarged to three times its normal size and the venous drainage of the stomach was markedly dilated. The right gastroepiploic vein was about 1 cm in diameter.

She responded well to the operation. Her weight, which was 59 pounds before pancreatectomy (fig. 2) rose so that she now weighs 90 pounds and continues to gain in spite of the fact that she is almost edentulous (fig. 3). Her appetite is excellent and further gain is expected when her teeth are replaced. Her diabetes is easily controlled and pancreatic extract is given as substitutional therapy. After a long, tedious, and exasperating process both for the patient and for ourselves narcotics are no longer required. The serum amylase after operation has been normal.

Comment. Grossly, the pancreas showed diffuse calcification. The duct of Wirsung emptied into the duodenum as a separate channel and was completely obstructed by stones 1 cm proximally to the ampulla. The stones were compressing the common bile duct, causing partial obstruction. The duct of Santorini could

not be identified. The right and left hepatic ducts became a common channel after entering the head of the pancreas. The gall bladder emptied in the right hepatic. Microscopically, the acini structure of the gland was replaced with calcium and fibrosis (fig. 4). The enlarged spleen and venous dilatation in the upper abdomen indicate that the pancreatic disease was causing portal

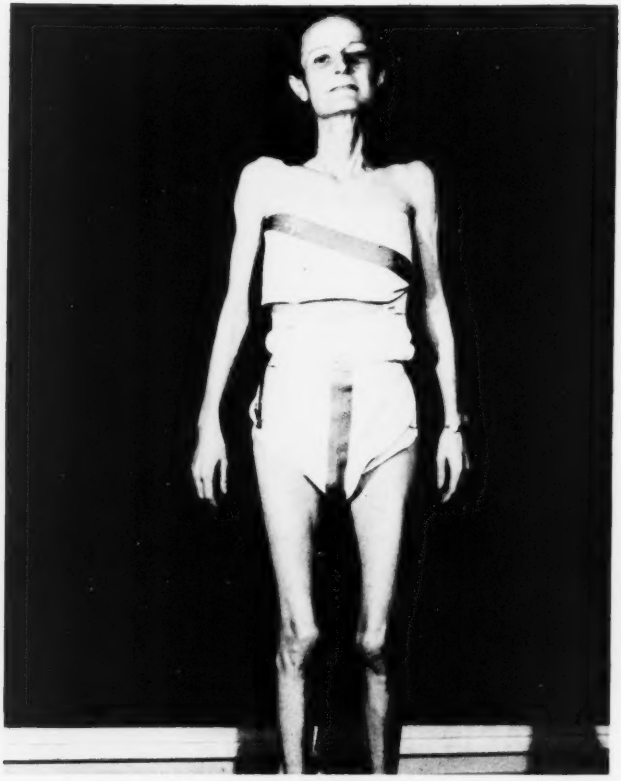

Figure 2 (case 12). Prior to her pancreatectomy, the patient's weight was 59 pounds.

obstruction. Unfortunately, venous pressures were not measured. The venous distention became less prominent after removal of the pancreas. The edema of the gall bladder and blunting of the liver edge suggest biliary tract disease secondary to pancreatitis. The pancreatojejunostomy was nonfunctioning.

This patient is a classical example of surgical procrastination in the application of measures to relieve her pancreatic obstruction. Too little too late probably necessitated total pancreatec-

tomy. Had she had a definitive operation after the second or third attack she might have been spared a long debilitating illness. The fact that her serum amylase is normal after pancreatectomy is interesting and is attributed to salivary function.

Figure 3 (case 12). Four months after total pancreatectomy, the patient's weight is 90 pounds.

DISCUSSION

The chain of events leading to the malady of chronic pancreatitis with calcium deposits is probably not identical in every case. The time interval between the first attack and the demonstration of calcium in the organs is also variable. We have seen calcification appear in a matter of months in some, while in others it took years. Its appearance is probably in direct proportion to the severity of the precipitating factors. Certainly alcohol played a prominent role in this series.

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Cholecystitis and cholelithiasis as causative factors have lost favor with the years. Comfort, Gambil, and Baggenstoss[6] have suggested, on the contrary, that pancreatitis may be the cause of biliary tract disease. The findings in our case 12 corroborate their suggestion. When gall bladder disease exists concomitantly, it should be surgically treated as indicated. No matter

Figure 4 (case 12). Section of pancreas, showing acinar structures replaced by fibrous tissue and calcium deposition in the ducts. (× 100)

what the exciting factors are in the precipitation of the disease, once in motion, chronic debilitating disease is the result in a large number of cases.

Beling[7] in 1940 stated that of 140 cases of pancreatic stone reported in the literature only 12 cases exhibited disseminated calcification, and he added a case of his own. It was about this time that one of us became interested in this disease. Our im-

pression has been to the contrary. In fact, we have been impressed with the large number of disseminated cases as compared with the few with localized deposits in the larger pancreatic ducts. We have noted only two cases of localized disease in an over-all total of perhaps 30 to 40 cases during this period, seen here and elsewhere by the senior author. This may be due to the preponderance of our patients being alcoholics. This observation is supported by Edmundson, Bullock, and Mehl,[8] who noted that multiple disseminated stones are more common in victims so habituated. On the other hand they believed diabetes is less common in the alcoholic, which has not been our impression. Although only 25 per cent of the patients in this series were definite diabetics, four others had glucose tolerance curves so suggestive that we feel it is only a matter of time before a diagnosis of diabetes will be established.

The most important diagnostic measure in establishing calcification is that of roentgenologic examination of the abdomen. This should consist of a survey film of the abdomen including anteroposterior and lateral views. Often roentgenographic scout films are overlooked and the pancreas is obscured by barium in the intestinal tract.

A differential diagnosis has to be made from calcium deposits in other organs of the abdomen. Pancreatic stones are almost pure calcium and cast a denser shadow than most gallstones. If doubt exists, an opaque catheter passed through the duodenum will circumscribe the head of the pancreas, ruling out gallstones by reason of location. This maneuver would have prevented an error of diagnosis in one of our cases.

Renal calculi can usually be diagnosed by pyelograms. Calcification in the aorta consists of linear deposits parallel to the spinal column and is less dense. Calcification in the splenic vessels may be misleading because of its intimate relation with the tail of the pancreas. Calcified lymph nodes in the vicinity of the pancreas may be confusing; they have been diagnosed as pancreatic stones. The differentiation will often depend on a composite of all the clinical facts in the case.

Aside from functional disturbances, complications of pancreatic calculi include the development of cysts, abscesses, hemorrhage, and carcinoma. Cysts and abscesses should be treated before a definitive operation is undertaken. Erosion of a stone into a blood vessel with hemorrhage and death has been reported by Fanger.[9] In his case the stone had formed a fistulous tract between the pancreas and duodenum. The diagnosis of pancreatic calcification was made at autopsy. He found two other similar cases, both in the foreign literature. A small percentage of cases show malignant change which does not necessarily bear any relationship to the presence of calculi.

Steatorrhea is often severe and probably occurs about as often as diabetes. The response to substitutional therapy has been generally poor in our experience. The literature repeatedly mentions pulmonary tuberculosis as being associated with pancreatic disease. The poor state of health and nutrition renders the victim more susceptible to the ravages of this infection.

TREATMENT

The treatment of pancreatitis has passed through several phases. The disease was described by the pathologist and later attacked by the surgeon. Surgical results being rather poor in the acute stage, medical management gradually became the treatment of choice. The advent of the Whipple surgical approach for carcinoma of the head of the pancreas has been a guiding light in the surgical treatment of chronic disease of the organ.

It is the growing opinion of the internist and surgeon that recurring pancreatitis is essentially a surgical disease. Medical management still has its place in mild cases with infrequent attacks.

Warren[10] has recently outlined and described the methods of surgical attack by the direct and the indirect methods. While there is a rationale for both types of procedures, we are beginning to feel that the direct approach is probably the method of choice in most cases. The direct surgical attack on any pathologic process is axiomatic in surgical therapy and should apply to chronic disease of the pancreas. In our hands operations on the biliary and intestinal tracts as well as those of nerve interruption have not met with the success reported by others.[11-15] It may be that good results have been reported prematurely or, perhaps, that we are in the unenviable position of being haunted by our failures.

Pain and obstruction in chronic pancreatic calcification are the chief indications for operation. Link[16] recently reviewed a case upon which he performed pancreatostomy in 1910 with good results. It seems obvious that the secret of Link's success was the relief of pancreatic obstruction. Cattell and Warren,[17] Zollinger, Keith, and Ellison[18] and Duval[19] are advocates of this surgical principle, one which we believe to be a step forward in the treatment of this disease.

Many patients with chronic pancreatitis are addicted to morphine and are hard to evaluate correctly before and after operation. In many instances it is hard to determine true narcotic addiction. Most people are hesitant to admit habituation of any type. We tried to separate the pain and drug factors in our case of total pancreatectomy by using continuous epidural anesthesia. This patient did well for 8 to 10 hours under this regimen but again complained of severe pain in spite of what seemed to be

adequate anesthetic effects. After operation morphine requirements continued unabated and it was a long tedious process to effect a cure.

The direct surgical approach offers several procedures that may be used singly or in combination. The most important of these procedures are (1) pancreato-lithotomy, (2) partial pancreatectomy, (3) pancreato-duodenectomy, (4) pancreato-jejunostomy or gastrostomy, and (5) total pancreatectomy.

The choice of any of these operations alone or in combination will depend on the pathologic process encountered. The object is to remove the disease, to relieve pancreatic obstruction, and to provide drainage of the ductal system of the organ.

CONCLUSIONS

Chronic pancreatic calcification is the end stage of a serious and debilitating malady. Precipitating factors are variable but alcoholism is common. The complications of diabetes, steatorrhea, chronic malnutrition, and drug addiction are frequent. Tuberculosis, cirrhosis of the liver, and disease of the stomach and duodenum are commonly associated and add to the burden of treatment.

The clinical diagnosis of pancreatic calcification is often missed, only to be made at laparotomy or autopsy. The significance of hyperparathyroidism with pancreatic calcification is not clear but the condition suggests the study of calcium and phosphorus metabolism in more patients with this disease.

The direct surgical approach is usually the treatment of choice and should be practiced in most cases as soon as the diagnosis of chronic relapsing pancreatitis is established.

Total pancreatectomy is an operation of major proportions with a high mortality and should be reserved for patients in whom other attempts have failed.

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SILENT GALLSTONES

There is no such thing as a completely silent gallstone. Gallstones are not only indications of disease but also are always potential causes of complications far more dangerous than is simple elective cholecystectomy performed during a quiescent phase. Coexisting disease should often be an indication, rather than a contraindication, for cholecystectomy. General acceptance of this attitude toward calculous cholecystic disease by the general practitioner, internist, surgeon, and patient will not only lead to a greater degree of satisfaction to patient and doctor alike but also will save many lives. This is a responsibility we are obliged to accept.

—JAMES M. MARSHALL, M. D.
in *American Journal of Surgery*
p. 366, Sept. 1954

ASYMPTOMATIC AMEBIASIS

Treatment With Atabrine in Combination With Carbarsone or Chiniofon

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OBSERVATIONS by Radke[1] on the efficacy of Atabrine (brand of quinacrine) in the therapy of amebiasis prompted us to use it in treating persons found to be infected with *Endamoeba histolytica,* in an epidemiologic study of amebiasis among several rural groups in Yamanashi Prefecture, Japan. All patients were asymptomatic or at least could be considered to have minimal symptoms. Atabrine was used in combination either with carbarsone or chiniofon.

The first combination was recommended by Radke.[1] Although he had found Atabrine alone to be significantly effective against the intestinal phase of the infection, he believed that combined therapy was indicated. Its specific use against amebic liver infections has apparently been limited to 15 patients treated by Radke[2] successfully, and four treated by Abd El-Ghaffar and Abd El-Ghaffar,[3] with failure of treatment in one patient.

PROCEDURES

Drug dosages are recorded in table 1. Persons under care of a physician, the senile, and those with albumin or increased urobilinogen excretion in the urine were excluded. Pregnant women were included, but two persons with diabetes were not treated. At the end of four days and at the end of therapy, each person was interviewed to ascertain side reactions and the amount of drug actually taken.

All stool examinations were made by means of the formalin-ether (406 MGL) technic.[4] Direct smears or polyvinyl alcohol preparations[5] were not made because of the elapsed time between collection and processing of stools. The time and number of post-treatment examinations varied, but the preferred procedure was to examine a stool specimen at five weekly intervals about four months after termination of therapy. The four-month period

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between therapy and post-treatment examinations assured time for treatment failures to be re-established as detectable infections, and the weekly interval between five consecutive examinations probably encompassed some benefits because of the natural fluctuations in cyst numbers. A longer interval would be desirable, but co-operation tends to wane; furthermore, our co-operating groups were farmers, and it was requested that examinations be limited to their slack periods of work.

TABLE 1. *Dosages. Atabrine given simultaneously with either carbarsone or chiniofon*

Age group (years)	Atabrine (grams)	Carbarsone (grams)	Chiniofon (grams)
3-6	0.1 q.d.	0.25 q.d.	0.25 t.i.d.
7-11	0.1 b.i.d.	0.25 b.i.d.	0.50 t.i.d.
12-69	0.1 t.i.d.	0.25 t.i.d.	0.75 t.i.d.
70 +	0.1 b.i.d.	0.25 b.i.d.	0.50 t.i.d.

q.d. = dosage divided; half given after breakfast and half after supper
b.i.d. = given after breakfast and supper
t.i.d. = given after breakfast, dinner, and supper

Certain factors impose limitations on the evaluation of amebicides. Paramount among these is the inadequacy of available diagnostic procedures for determining whether or not a patient has been successfully treated. This was compensated for by performing multiple post-treatment examinations. Other factors influencing evaluations include the possibility of reinfections occurring between therapy and completion of post-treatment examinations. This was a matter of particular concern in this study, because the persons were, in part, from highly endemic centers. It was demonstrated, however, that reinfections were minimal.[6] Spontaneous elimination of infections is another possibility, but in an interval of a few months it probably would be inconsequential. Failure of co-operating persons to take drugs as prescribed is also a limiting factor.

RESULTS AND DISCUSSION

In a preliminary series, Atabrine and carbarsone were administered simultaneously for only seven days, using dosages as shown in table 1. Because the failure rate as calculated after the second post-treatment examination was excessive (65 per cent), the number of days of treatment was increased in the four series being reported.

Series 1. In series 1 (table 2), the administration of Atabrine and carbarsone was extended to 14 and 10 days, respectively. Post-treatment examinations were made five times at monthly

TABLE 2. *Results of therapy in asymptomatic amebiasis using Atabrine in combination with carbarsone and chiniofon*

Parasite	Series 1			Series 2			Series 3			Series 4		
	Atabrine 14 days Carbarsone 10 days			Atabrine 14 days Carbarsone 10 days			Atabrine 14 days Chiniofon 7 days			Atabrine 14 days Chiniofon 10 days		
	Cases	Failures	Per cent	Cases	Failures	Per cent	Cases	Failures	Per cent	Cases	Failures	Per cent
Endamoeba histolytica	40	10	25.0	17	0	0.0	22	3	13.6	10	1	10.0
Endamoeba coli	35	13	37.1	17	2	11.8	18	6	33.3	8	2	25.0
Endolimax nana	37	13	35.1	17	2	11.8	13	10	76.9	8	5	62.5
Iodamoeba bütschlii	9	1	11.1	1	0	0.0	3	0	0.0	0	-	-
Giardia lamblia	5	1	20.0	3	0	0.0	3	0	0.0	2	0	0.0

intervals, beginning about two weeks after completion of therapy. Twelve of 40 persons included in this series submitted only four post-treatment stools; five additional persons submitting fewer specimens (not proved positive for *E. histolytica*) were excluded. Ten of the 40 persons remaining in the series retained their *E. histolytica* infections, a failure rate of 25 per cent. Unfortunately, records of the number of pills taken were lost. Had this information been available, possibly some of the failures could have been excluded on the basis of failure of persons to take medication.

Series 2. In series 2, 17 persons took essentially all the Atabrine (14 days) and carbarsone (10 days), and submitted five stools at weekly intervals, starting four to five months after completion of therapy. About twice as many started the treatment, but discoloration of the skin caused by the Atabrine offended a number of persons and, although most of them had completed therapy, it reduced their co-operation during the post-treatment period. Of the 17 persons co-operating, none were found to harbor *E. histolytica* after treatment.

Series 3. In series 3, Atabrine and chiniofon were administered simultaneously for 14 and 7 days respectively, and 22 persons co-operated sufficiently to be included. Post-treatment examinations were limited to three stool specimens which were collected over a period of one week, beginning five months after therapy. Three of the 22 persons (13.6 per cent) still were found to harbor *E. histolytica*.

Series 4. In series 4, Atabrine and chiniofon were administered simultaneously for 14 and 10 days, respectively. Co-operation was not good in this group, and data from only 10 persons were useable. Five post-treatment stools obtained from each of the 10 at weekly intervals, four to five months after therapy, indicated that only one of them harbored *E. histolytica*.

These observations substantiate Radke's[1] conclusion that a combination of Atabrine and carbarsone is effective against intestinal amebiasis. His observations that Atabrine alone accounted for a significant, though inadequate, level of efficacy was supported by Bernstein[7] who found that the stools from all but two of 30 persons were negative after an Atabrine dosage of 0.1 gram three times a day for five days and repeated after a five-day interval. Relatively ineffective results obtained with chloroquine phosphate against intestinal amebiasis by other investigators[8-10] increases the probability of Atabrine superiority in this role. Reports of Atabrine therapy against amebic liver abscesses are too few for a conclusive comparison with the repeatedly successful usage of chloroquine phosphate. Radke,[2,11] however, treated 15 such cases with Atabrine and obtained re-

sponses comparable with those reported for chloroquine phosphate, and with fewer toxic reactions. Also, Abd El-Ghaffar and Abd El-Ghaffar successfully treated two of three patients with amebic liver abscesses and a patient with acute amebic hepatitis. Thompson and Reinertson[12] presented data indicating that Atabrine reduced the weight of liver abscesses in hamsters more than either emetine hydrochloride or chloroquine phosphate. *In vitro* tests by Radke[13] and others whom he cites, indicated high amebicidal action for Atabrine. More recently, by means of *in vitro* tests, Abd El-Ghaffar and Abd El-Ghaffar found Atabrine to be about 10 times as effective as chloroquine phosphate against *E. histolytica*.

From results thus far obtained with Atabrine, critical *in vivo* comparisons with chloroquine phosphate, each in combination with other amebicides, appear warranted, particularly because the only other drug effective against extraintestinal amebiasis is emetine, which, though highly effective, is essentially limited to hospitalized patients. Relative merits to be considered include: (1) effectiveness against intestinal infections, liver abscesses, and low grade hepatic involvements; (2) side reactions; and (3) cost, which is of special importance for mass therapy.

Although we observed very few side reactions with Atabrine and carbarsone, the toxic hazard with the arsenical noted by Radke[1] and Fischl[14] makes its use in mass therapy for even 10 days questionable, whereas the iodoquinolines can be used safely for prolonged periods. The degree of success which we obtained with the chiniofon-Atabrine combination suggests that either chiniofon or Diodoquin (brand of diiodohydroxyquin) might advisedly be used with Atabrine for at least 14 days. Co-operation was not good in the chiniofon-Atabrine groups because of diarrhea produced by chiniofon. This might be circumvented by substituting Diodoquin or by reducing the quantity of chiniofon to 0.5 rather than 0.75 gram after each meal. The superior results obtained by Yokogawa, Wykoff, and Ritchie[15] in the treatment of asymptomatic amebiasis with carbarsone and chiniofon, each given for seven days in sequence, prompt the suggestion that this regimen be used concurrently with Atabrine. With the three drugs, dosages might be sufficiently reduced to compensate for added costs without crossing the margin of therapeutic efficacy. The following regimen for persons 12 years and over is proposed: 0.1 gram of Atabrine three times daily for 14 days; and, simultaneously, 0.25 gram of carbarsone twice daily for the first week, and 0.5 gram of Diodoquin three times daily the second week.

Fostering the use of nonantibiotics seems warranted, particularly in mass treatments for which antibiotics appear impractical. Furthermore, the relative merits have been judged by Anderson et al.[16] as follows: ". . . Antibiotics now available

do not offer very significant differences in percentage of patients cleared, over accepted synthetic amebicides of the non-antibiotic class."

SUMMARY

A satisfactory level of efficacy was achieved with Atabrine (0.3 gram for 14 days) and carbarsone (0.75 gram for 10 days) for the treatment of asymptomatic intestinal amebiasis, corroborating the conclusion of Radke.[1] In one series of 40 cases, 10 failures (25 per cent) were observed, some of which may have been due to failure to take all the drugs. In a second series of 17 cases, no failures were observed. In two series treated with Atabrine and chiniofon, comparable results were obtained against *E. histolytica*. Administration of an iodoquinoline compound could be safely extended beyond the time here reported, which is hardly allowable with the arsenical.

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DAMAGING EFFECTS OF STRENUOUS EXERCISE

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WILL the strain of physical-training testing produce injury in some persons? This question was raised in the fall of 1954 at this dispensary. A search of reports seemed to show that all prior studies relating to the effects of physical activity had been on either young college students or hospitalized patients. To determine the effects of stress on mature normal persons, especially those of sedentary habits, the present study was initiated.

METHODS

The study group consisted of 107 men on active military duty. A complete physical examination that included chest roentgenogram, electrocardiogram, and urinalysis showed normal findings in each man. Thirty-six men, about one third of the entire group, were over 30 years of age.

Before the start of the program of physical-training testing and at the end of the testing period, each man was given a vital capacity test and the Harvard Step Test for Cardiac Functional Fitness.[1] The Harvard Step Test consists of having the subject step up and down a 20-inch platform 30 times a minute for 5 minutes, unless he stops from exhaustion before the time is up. The pulse is counted from 1 to 1½, 2 to 2½, and 3 to 3½ minutes after the work stops. The score is obtained by dividing the duration of the exercise by the sum of pulses in recovery according to the formula:

$$\text{Index} = \frac{\text{Duration of exercise in seconds X 100}}{\text{Sum of pulse counts in recovery X 2}}$$

The meaning of the figures thus obtained is as follows:

Below 55 = Poor condition
55 to 64 = Low average condition
65 to 79 = High average condition
80 to 89 = Good condition
Above 90 = Excellent condition

From U. S. Army Post Dispensary, Fort Lewis, Wash. Dr. Hess is now at 4437 Grandview Place, Tacoma 66, Wash.

This test was developed by Lucien Brouha and colleagues in the Harvard Fatigue Laboratories to measure the general capacity of the body to adapt itself to hard work and to recover from what it has done. The test was originally validated against the criterion of a work index based on three factors of endurance treadmill running, maximum heart rate per minute, and blood lactate level. This test has been widely used in recent years, both in physical fitness testing programs and in research studies.

The physical-testing program consisted of the daily performance of the five parts of the Army indoor physical fitness test[2] without rest between events. These parts are (1) pull up, (2) squat jump, (3) push up, (4) sit up, and (5) 60-second squat thrust. Each day the subject's pulse and blood pressure were recorded before exercise, immediately after, 5 minutes after, and 15 minutes after. On the first and last days the pulse rate of 30 subjects was counted until it had returned to normal. Whenever any unusual reaction was noted, the man was examined by a medical officer. This resulted in removal of three subjects from the study before they had completed it.

RESULTS OF THE STUDY

In contrast to the results in the older subjects, higher scores, better recovery, and absence of serious reactions were noted in the younger men. Accordingly, the men were divided in two groups with the age of 30 as the dividing line. A total of 71 subjects under, and 36 over, 30 years of age began the study. The ages of the men in the younger group ranged from 18 to 28 and averaged 21.7 years. The older group included men from 30 to 47 years of age with an average of 36 years.

Three of the original 107 men could not complete the study because of physical abnormalities. All three were over 30 years of age, being 8.3 per cent of the "over 30" age group. One, aged 33, who had a previous back injury, found it necessary again to wear a brace on the third day of exercises, and had to discontinue participation in the study on the fifth day. This soldier, on sedentary duty, weighed 255 pounds and was 76 inches tall. Except for the back injury his medical history and all physical findings were normal.

The other two men discontinued the exercises on the 11th day because of hypertension (cases 1 and 3).

Case 1. A 32-year-old soldier with nonsedentary duty weighed 199 pounds and was 71 inches tall. Before the physical training period, physical findings were all normal. The pulse rate was 84; blood pressure, 142/84 mm Hg; vital capacity, 76 per cent; and score on Harvard Step Test, 63. On the fifth day of physical-training exercises his blood pressure immediately after exercise was 206/94 mm Hg with recovery

to 160/100 mm Hg after three hours. On the 10th day of exercises the man's blood pressure was 188/90 mm Hg immediately after exercises and rose to 210/106 mm Hg 15 minutes later. On the 11th day an electrocardiogram showed a borderline tracing suggesting incomplete right bundle branch block, and a definite widening of the QRS time as compared to the electrocardiogram made previous to the study (fig. 1). The cardiology consultant recommended cessation of the exercising. The subject was removed from the study and did not take the second Harvard Step Test. The poststudy examination showed hypertension (160/100 mm Hg) but no additional abnormalities.

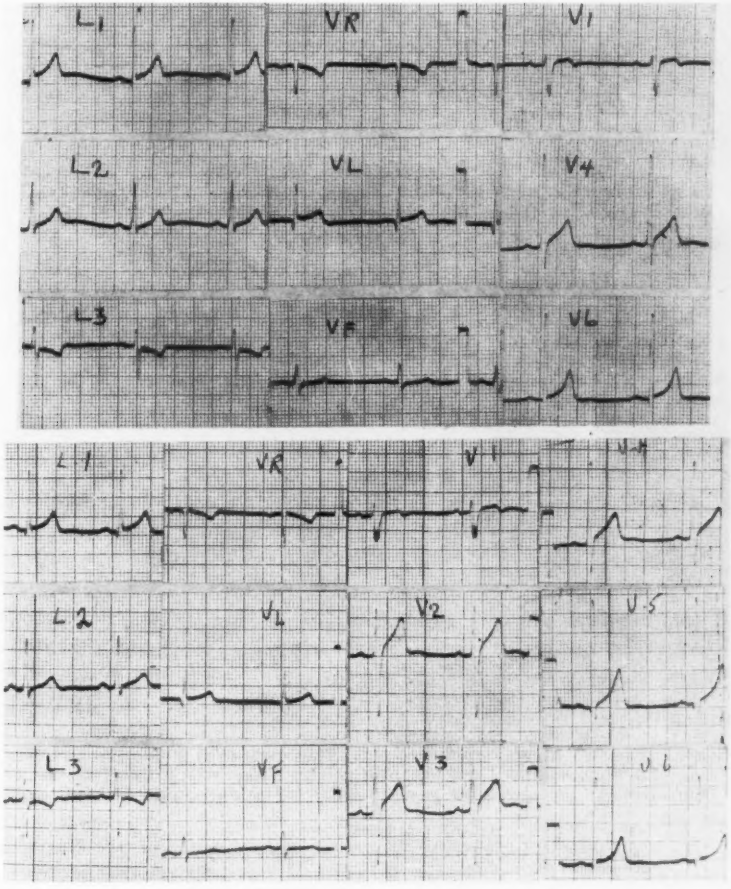

Figure 1 (case 1). Electrocardiogram on 27 November 1954 (top) is normal. On 21 December (bottom) it shows widening of QRS time and diminished amplitude of T waves with a tendency toward terminal inversion.

A fourth man, aged 35, reacted normally during the study, but had a resting blood pressure of 160/96 mm Hg during the final physical examination 4 days later.

Case 2. This soldier had nonsedentary duty, weighed 175 pounds, and was 69 inches tall. His medical history, chest roentgenogram, urinalysis, and physical examination were all normal. Electrocardiographic findings were slightly abnormal because of depression of the S-T segment in V_4 and low amplitude of T waves in V_6 (fig. 2). Before the physical training test period, his pulse rate was 98; blood pressure,

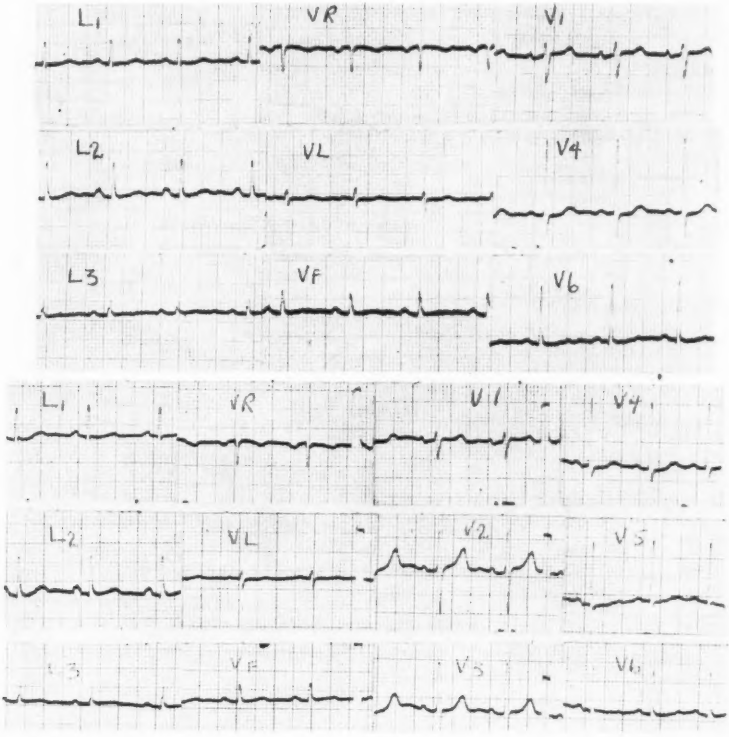

Figure 2 (case 2). Electrocardiogram on 27 November 1954 (top) shows depression of S-T segment (V_4) and low amplitude of T waves (V_6). On 21 December (bottom) it shows increased depression of S-T segment and lowering of T waves.

140/82 mm Hg; vital capacity, 66 per cent; and score on the Harvard Step Test, 43. The final electrocardiogram showed the rate had increased from 85 to 100 per minute and the record was then abnormal because of increased depression of the S-T junction and low T waves in V_6 (fig. 2). All poststudy examinations other than resting blood pressure and electrocardiogram were normal.

Other findings in the poststudy examinations are as follows:

1. Traces of albumin were found in four subjects, who were then hospitalized for several days until the urine had cleared. Subsequent tests remained negative.

2. Electrocardiographic changes were found in about 20 per cent of the subjects, but all remained within normal limits. Except for a slower heart rate in one case at the conclusion of the study, all changes were in the direction away from normal. These changes were an increase in resting cardiac rate, increase in degree of sinus arrhythmia, development of nonphasic sinus arrhythmia, increase in amplitude of ventricular complexes which initially approached the upper limits of normal, and occurrence of diphasic T waves in V_1.

3. No roentgenographic changes were noted.

4. No significant changes occurred in vital capacity of the subjects. Results of these tests are shown in table 1.

TABLE 1. *Average scores on vital capacity tests given before and after physical-training testing*

Age group	Before study		After study		Average predicted normal vital capacity
	Average vital capacity	Per cent of predicted normal	Average vital capacity	Per cent of predicted normal	
Under 30 years	4.17 liters	88.7	4.12 liters	87.3	4.69 liters
30 years and over	4.21 liters	87.0	4.21 liters	87.0	4.86 liters

All subjects showed regular improvement in the ability to perform exercises. Greater improvement occurred with respect to exercises requiring more co-ordination, in contrast to those requiring strength or endurance chiefly. Results of the indoor physical fitness test, which was the daily exercise, are listed in table 2.

The average pulse recovery time for each age group after the first day of exercise and after the last day of exercises is shown in table 3.

Fifteen minutes after exercise, the pulse rate returned to normal in less than 5 per cent of the 104 subjects who completed the study. For 15 subjects over 30 years of age, selected at random as a sample, the average time required for the pulse to return to normal was 29 minutes. For 15 subjects under 30 years, also selected at random as a sample, the average time required for pulse to return to normal was 23 minutes.

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TABLE 2. *Average scores on indoor physical fitness test on first and last days of study*

Age group	Average score		Degree of improvement in score
	First day	Last day	
Under 30 years	157	210	53
30 years and over	92	134	42

TABLE 3. *Average pulse rates at various times before and after exercise on first and last days of study*

Age group	Day of exercise	Average pulse before exercise	Average pulse rate after exercise			
			Immediately	2 min.	5 min.	15 min.
Under 30 years	First	77	137	115	104	93
	Last	79	143	110	101	93
30 years and over	First	79	136	119	104	96
	Last	78	141	116	103	96

On one or more days, about 10 per cent of the men experienced tachycardia, which lasted 1½ to 2 hours after exercise. This occurred with no correlation to the men's ages.

Like the vital capacity test results, scores on the Harvard Step Test were practically unchanged by the two weeks' exercises. The average scores by age groups are recorded in table 4.

TABLE 4. *Average scores on Harvard Step Test given before and after physical-training testing*

Age group	Average score		Degree of improvement in score
	Before study	After study	
Under 30 years	83.2	84.9	1.7
30 years and over	65.2	65.4	0.2

To illustrate the differences in the response of subjects, as well as to demonstrate the methods of study, the following examples are offered:

Case 3. A 34-year-old soldier with sedentary duty weighed 230 pounds and was 69 inches tall. His medical history, chest roentgenogram, uri-

nalysis, electrocardiogram, and physical examination were normal. Before the physical training test period, his pulse rate was 72; blood pressure, 140/90 mm Hg; vital capacity, 51 per cent; and score on Harvard Step Test, 27. On the third day of physical training exercises, it required 1 hour and 25 minutes for his pulse rate to return to the pre-exercise level. His indoor physical fitness test score that day was 78. On the eighth day of exercises his blood pressure rose to 190/76 mm Hg, but fell to 164/94 mm Hg after 15 minutes' rest. On the 10th and 11th days his blood pressure was over 200 mm Hg after exercise, in which he scored only 76. An electrocardiogram (fig. 3) taken on the

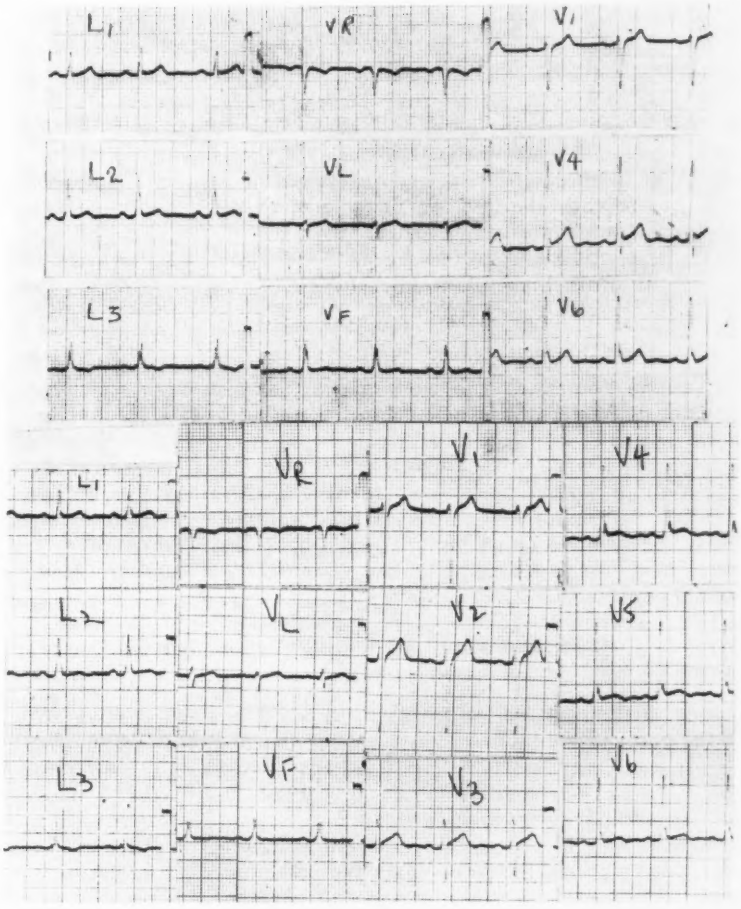

Figure 3 (case 3). Electrocardiogram on 27 November 1954 (top) is normal. On 21 December (bottom) it shows notching of descending limb of R wave in V_4 and V_5.

11th day showed notching of the descending limb of the R wave in V_4 and V_5. The subject was removed from the study and did not take the second Harvard Step Test. The poststudy examination showed hypertension (155/100 mm Hg) but no additional abnormalities.

Case 4. A 19-year-old soldier from an infantry regiment regularly had physical training. His weight was 176 pounds, and his height, 67 inches. The findings of his medical history, urinalysis, electrocardiogram, and physical examination were normal, but the chest roentgenogram showed his cardiothoracic ratio to be 10 per cent greater than average. His vital capacity was 96 per cent and he scored 78 on the Harvard Step Test. His resting pulse rate was 64, but on the third day it had risen to 74. Following the exercise, in which he scored 170, the heart rate required 1 hour and 45 minutes to return to the pre-exercise level. The following day the resting pulse had increased to 84, and an electrocardiogram was made. This showed no change other than the increase in rate. The rapid rate and a one-hour recovery period required for the pulse to return to the pre-exercise level continued through the 13th day. From the ninth through the 13th day, the subject complained of substernal discomfort after exercises. On the 14th day his pulse recovered to the pre-exercise level of 84 within 30 minutes, and he scored 162 on the indoor physical fitness test. His score on the second Harvard Step Test was 85, and findings of all final examinations, including an electrocardiogram, were normal. His resting pulse rate was 88.

DISCUSSION

Exercise increases the work of the heart through augmenting cardiac output and elevating blood pressure. With tachycardia there is a decrease in the diastolic rest period. The combination of increased work with decreased rest produces fatigue, which may lead to heart failure. Failure of a healthy heart is unlikely because the limits of exercise are determined, not by the heart alone, but "by the sum of changes taking place throughout the body."[3] If the heart is diseased, overexertion may precipitate cardiac decompensation and even cause death.[4] This is particularly true when the disease involves the coronary vessels, because it is the flow of blood through them which enables the heart to recover from the effects of fatigue.[4]

It is difficult, if not impossible, to determine the precise state of the coronary vessels. Therefore, one cannot foretell accurately how a particular heart will respond to a certain physical strain. Yet because arteriosclerosis is in general correlated with age, and indeed is not rare in youth,[4] one can predict that men approaching middle age and beyond will have greater difficulty than will younger men in recovering from the same physical stress.

In our study, the more serious deviations from normal were found only in the subjects over 30 years of age. We believe this trend would be more noticeable in men aged 40 to 60 years. We

think the physical stress tends to bring out latent bodily defects. At least 40 per cent of adults are said to be actually or incipiently hypertensive.[4]

During the exercise period, men from units which had had regular physical training scored higher and were in better all-around physical condition. During the two weeks, the scores attained in the physical fitness tests improved considerably. In contrast, there was no significant improvement in the general capacity of the body to adapt itself to, or recover from, hard work. Neither was there any significant change in vital capacity. Can we conclude, then, that repeated physical stress does not prepare the circulatory system to withstand further shocks? This study leads us to believe that physical training of this type is not the determining factor in the prevention of cardiocirculatory damage from unusual physical activity. Further study is needed before reaching definite conclusions regarding the relationship of physical training to cardiac fitness.

CONCLUSIONS

Several studies have shown the effect of physical activity upon the heart rate, blood pressure,[5] and electrocardiographic findings.[6] This study has shown that strenuous physical activity can accentuate the changes to the point where they become pathologic. Therefore, we believe that the present Army physical training program should be revised to fit the lesser physical abilities and potentials of men over 30 years of age. We believe, also, that planning of physical training programs should give full recognition to the fact that such training does not fundamentally affect the cardiocirculatory functional fitness, although it may greatly improve specific motor skills. Finally, we submit that the Harvard Step Test may be used as a reliable guide to indicate which men over 30 can be expected to accomplish strenuous physical activity without danger to their cardiocirculatory system.

SUMMARY

Under close medical supervision, the reactions of a group of 107 healthy soldiers were studied while the men were subjected to a daily physical fitness testing program for two weeks. Four men, all over 30 years of age, developed physical abnormalities —three of them so soon that they were unable to complete the program. Our methods and findings are discussed. Present physical training programs should consider the lesser physical abilities and potentials of men over 30 years of age.

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THIS PROGRESSIVE AGE

"One of the several disabilities of contemporary life is the endless assault upon our minds of scientific discovery and the glittering inventions of applied science. At one moment we are staggered by the astronomer's revelation of galaxies beyond the galaxies that were charted yesterday; and scarcely have we accepted a new breach in the frontiers of the sky when we are summoned to applaud a new invasion of the bacteriologist's fearful kingdom by yet another successfully isolated antibiotic. The physicist, having profoundly alarmed us by a demonstration of nuclear fission, throws us into deeper consternation by the more dreadful menace of fusion; and the psychologist, after shocking us by an exposure of the sexual snake-pit that underlies our conscious minds, throws us into profounder gloom with his assurance that every human brain is still haunted by the ritual obligations of the Stone Age. In the material and visible world we see aircraft flying at supersonic speeds, and, desperately trying to keep abreast of them, we study aerodynamics, metallurgy, and jet-propulsion; while nightly, before an illuminated screen and entertainment that used (unfairly) to be confined to the nursery, we are stimulated to think of the laws that govern the emission of electrons from a surface irradiated by light, and of the quantum theory of Planck that encouraged them to do so."

—ERIC LINKLATER
in *British Medical Journal*
p. 1517, Dec. 24, 1955

QUANTITATIVE DETERMINATION OF ETHYL ALCOHOL IN BLOOD

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AMONG the many chemical analyses performed in the clinical laboratories of our Armed Forces medical services, probably no other is open to more discussion than that of the determination of blood alcohol. Despite lively arguments pro and con as to its true role and value, the determination of blood alcohol still remains an aid to the physician in his diagnosis of alcoholic intoxication. Probably a reason for this discussion is the fact that it has been permitted to stray from its true role, and from where it rightly belongs. Such a role is that of a clinical laboratory examination accomplished only at the request of the examining medical officer, when and if he deems it necessary, and reported only to that physician for his use as an aid in diagnosis. Such a report is made only to him by the laboratory officer responsible for the analysis.

My purpose is to report the system used in a central Army medical laboratory in processing large numbers of blood alcohol determinations over a two-year period for eight Army and two Air Force dispensaries.

METHOD OF SUBMITTING SPECIMENS

Screw-capped vials, with distinctive labels attached, were prepared by the laboratory for the installations served. Each vial contained sufficient dry sodium fluoride to act as both anticoagulant and preservative (enzyme inhibitor) for 10 ml of whole blood. Instructions on the label stressed the necessity for shaking the vial after the blood had been introduced, so as to thoroughly mix the specimen and the fluoride. When this simple step was ignored or ill performed, the resulting blood clots made pipetting difficult, necessitated centrifugation of the sample, and performing the analysis on the remaining fluid portion. The vial was sealed by means of a gummed paper label, bearing in ink the person's name, time and date, and the signature of the medical officer. Some installations used paraffin as a further seal. The specimen, and at least two signed copies of the form "Sobriety Examination and Blood Alcohol Determination" (fig. 1) were delivered by messen-

From the USAREUR Medical Laboratory, Landstuhl Army Medical Center, Landstuhl, Germany. Captain Leifheit is now assigned to Valley Forge Army Hospital, Phoenixville, Pa.

ger to the laboratory where the specimens were logged in and stamped as to time received. The blood sample and all copies of the form were promptly delivered to the toxicology section, assigned a laboratory number, and stored briefly in the refrigerator to await analysis.

TYPE OF REPORT

Figure 1 is a replica of the form adopted by this laboratory for use of the installations served. Although it is not an "official form," it has been found satisfactory by medical officers and hospital laboratories using it, as well as by the many courts-martial and Boards, Air Force and Army, before which it has been presented in legal and administrative proceedings.

Favorable Factor of This Type of Report. An appealing factor is that the completed form embodies a concise report of the clinician's examination and opinion, plus the laboratory report of the blood alcohol determination if the clinician saw fit to request it. In legal actions, this plan makes unnecessary the collection of separate medical records and laboratory reports.

Criticism of Such a Report. A criticism sometimes presented is that the clinician's observations are of no concern to the laboratory, and can possibly influence results. This is, indeed, a questionable stand, and one which can make for blind, drab, and uninspired laboratory work. It is most instructional and stimulating for laboratory workers to be permitted to observe the correlation between their results and the physician's findings. Where there was poor correlation, communication with the medical officer often revealed the subject to be a person known to the physician as having abnormally high or low alcohol tolerance. Interesting, indeed, were the several cases where very low blood alcohol concentrations did not correspond with the observations recorded by the medical officer, and further analysis by ultraviolet absorption technics revealed the presence of barbiturates. Further quantitative determinations in these cases disclosed significant blood barbiturate levels. Such findings were most surprising to, and appreciated by, the medical officer, and gave the laboratory personnel concerned a genuine feeling of accomplishment.

Another criticism that could be leveled at this type of report is that, if the results of a blood alcohol determination are to be used by the medical officer as a diagnostic aid, it seems unfair for the physician to commit himself on a diagnosis before first knowing the blood alcohol level. It is surprising how seldom this criticism was presented. The vast majority of physicians were most willing to commit themselves in writing, while an independent "chemical diagnosis" was made in the laboratory. The blood alcohol report would then (1) confirm, (2) fail to confirm, (3) have no effect on, or (4) possibly change, the medical officer's diagnosis.

SOBRIETY EXAMINATION AND BLOOD ALCOHOL DETERMINATION

DIRECTIONS: Draw 10 ml (cc) of whole blood. Transfer to tube prepared with dry anticoagulant (150 mg sodium fluoride). Shake tube well to thoroughly mix blood and fluoride.

No other laboratory slip required. Submit this form in duplicate.

CERTIFICATE OF MEDICAL OFFICER

I certify that I have medically examined at _____hours _____195___

NAME _____Rank _____ASN_____

ORGANIZATION _____ADDRESS _____

1. The following observations apply to this person (Place "X" in appropriate column):

Yes	No	
___	___	Flushed face
___	___	Dilated pupils
___	___	Odor of alcohol on breath
___	___	Loud or abusive language
___	___	Incoherent speech
___	___	Clothing disarranged or soiled
___	___	Oriented as to time and place
___	___	Able to stand on one foot
___	___	Able to walk straight line
___	___	Unsteady gait
___	___	Obvious evidence of physical injury
___	___	Stuperous

2. Based on the above observations, in my opinion this person:

___ Shows no evidence of alcoholic intoxication
___ Has been drinking
___ Is intoxicated

3. Other remarks:

4. Blood was drawn in my presence. A nonalcoholic skin preparation was used. I sealed the container with a label bearing person's name, time, date, and my signature. Return this form with report of blood alcohol determination to undersigned at military address shown below.

IDENTIFYING WITNESSES:

_____
Signature of Medical Officer

_____

_____
Full Name (Print or Type) Rank

_____

_____
Military Address

LABORATORY REPORT

The seal on vial containing above specimen was intact upon receipt. Such vial was opened by the analyst and determination performed immediately.
Blood ethyl alcohol level of specimen was found to be_____milligrams per milliliter of whole blood, determined at _____hours_____195__, by_____.

_____
Signature of Laboratory Officer

_____ _____
Laboratory (Unit & Location) Full Name (Print or Type) Rank, Branch

Figure 1.

Records. Each determination was performed in duplicate, and the results entered in a permanent record book kept in the toxicology laboratory, with time, date, and name of analyst, corresponding to the person's name and laboratory number assigned to the blood specimen. Such values were then carefully entered on the last carbon copy of the two or more forms received, and typewritten in final form on the original and remaining copies. All copies were then checked and signed by the laboratory officer. The last carbon was retained as a file copy, and the original, together with any other copies, was sent in a sealed envelope directly to the medical officer making the request. The foregoing scheme provided a dual record which proved valuable in more than one legal development. Results were not reported over the telephone, unless the person calling was definitely known to be the physician; nor were the results divulged to persons inquiring at the laboratory. Investigators, commanding officers, et cetera, were always referred first to the medical officer concerned for such results and for a discussion of the case. However, the technics of the laboratory analysis and the physiologic and pharmacologic aspects of ethyl alcohol intoxication were freely discussed with interested commanding officers, investigators, trial counsels, and defense counsels.

Such a policy was surprisingly effective when instituted by the laboratory commander and rigidly followed by all laboratory personnel, and was appreciated by the medical officers concerned.

METHOD OF ANALYSIS

The method used for the quantitative determination of blood alcohol, and found to be most satisfactory for both speed and accuracy in a busy toxicology laboratory, was that of Kingsley and Current[1] as modified by the Fourth Army Area Medical Laboratory, Fort Sam Houston, Tex.[2] Further minor changes were made by the author. The chemist will recognize this technic as merely another application of the principle of the Conway microdiffusion cell. The procedure is here presented in its entirety.

Principle

This method is based on the diffusion of ethyl alcohol from the specimen into a potassium dichromate-sulfuric acid solution (Anstie's reagent), the entire system being in a sealed vessel in an autoclave. The color change, caused by reduction of dichromate to the chromic ion, is measured in a spectrophotometer. Such change is compared with similar changes caused by standard alcohol solutions similarly treated.

Reagents

1. Anstie's reagent, modified, stronger.

2. Absolute ethanol solution from which two per cent ethanol is prepared.

Apparatus

1. Bottle, screw-capped, 60-80 ml, wide-mouth (No. 8125-408-9150).

2. Tin strip (tin foil) (No. 9535-531-2050).

3. Five- to 7-ml antigen or vaccine bottles that will stand inside the wide-mouth bottle. Although cleanliness is imperative throughout the procedure, it is doubly important to ensure that the *outside* of the antigen or vaccine bottles and the *inside* of the wide-mouth, screw-capped bottles (jars) be chemically clean to prevent reduction of the Anstie's reagent.

4. Pipet, 2-ml, Ostwald (No. 6640-436-7000).

5. Pipet, 10-ml, transfer (No. 6640-437-9000).

Procedure

1. Into the screw-capped, wide-mouth bottles accurately pipet 10.0 ml of Anstie's reagent.

2. Pipet 2.0 ml of blood, or serum, into a vaccine bottle. Set up a duplicate.

3. Pipet 2.0 ml of distilled water for a control into a similar bottle.

4. Using small forceps, immediately place bottles inside the jars.

5. Cover mouths of the jars with two layers of metal foil, and screw on the caps firmly. Guard against danger of tipping, thus permitting blood or serum to mix with the Anstie's reagent.

6. Place jars in steam autoclave and heat for 30 minutes at 15 pounds' pressure. It is recommended that an interval timer be started when the autoclave dial reaches the desired point (15 pounds' pressure and temperature of about 120° C), and that steam be shut off at the end of 30 minutes. In the absence of an autoclave, comparable results can be obtained by placing jars in a 110° C oven for one hour. However, precautions must be taken to protect personnel from the effects of possible bursting of jars by the strong positive internal pressure. This can be done by placing jars in a covered, sturdy, nonairtight metal container.

7. Allow jars to cool to room temperature. Open jars, remove vaccine bottles with forceps, using the grasped bottle first to stir the Anstie's reagent. Pour reagent into a cuvette.

8. Read "optical density" of specimen tube at 600 mμ against the distilled water control set at "zero density" (100 per cent transmission) in a photoelectric colorimeter.

9. Each laboratory must determine the value for "K" under its own conditions. Then, optical density of the unknown x "K" = mg alcohol per ml blood. Most laboratories prefer to use a calibration curve routinely.

Calibration

1. Set up, in duplicate, five screw-capped jars and bottles. Add the following amounts of standard 2 per cent ethanol solution and pure distilled water to the bottles:

2 per cent ethanol (ml)	Distilled water (ml)	Corresponding values (mg ethanol/ml blood) using 2 ml blood
0.0	2.0	Control
0.1	1.9	1.0
0.2	1.8	2.0
0.3	1.7	3.0
0.4	1.6	4.0

2. To each jar add 10.0 ml of Anstie's reagent, place bottles prepared as above in corresponding jars, seal, and process as described. Read optical density of each standard at 600 $m\mu$, using control specimen for zero setting. Plot optical density readings against ethyl alcohol concentrations on graph paper.

Some Sources of Error

1. Improper preparation of absolute alcohol or standard 2 per cent ethanol solution, or faulty calibration of pipet or buret.

2. Metal foil used can be either aluminum, or a lead-tin alloy. In either case, care should be taken to prevent the dichromate-sulfuric acid solution from coming in contact with the foil, thus resulting in false high values due to reduction of the dichromate.

3. Lack of perfect seal for jars and resultant loss of alcohol.

4. Errors in pipetting exact amount of blood. It is recommended that the same calibrated 2.0-ml, Ostwald blood pipets be used repeatedly for this determination, and that samples be run in duplicate.

5. Scratched, dirty, and unmatched cuvettes used in the spectrophotometer.

6. Failure to check the calibration curve frequently, particularly when the spectrophotometer has been disturbed, or when fresh Anstie's reagent has been prepared. As a constant check on the curve, it is good practice to run several standards with every group of determinations.

7. Errors in measuring Anstie's reagent can be reduced by choosing an accurately calibrated 10-ml transfer pipet and using it exclusively for Anstie's reagent. When not in use, this pipet is filled with the reagent and maintained in a horizontal position.

8. Storing and preservation of blood: It is recommended that blood be taken by routine venipuncture, using a nonalcoholic skin disinfectant, such as an aqueous solution of 1:1000 mercuric chloride. About 10 ml of whole blood are transferred to a suitable tube (such as bottle, screw-capped, 23 ml, No. 8125-408-2300), containing about 150 mg of dry sodium or potassium fluoride.

The method as described has the following advantages: (1) All apparatus and reagents are Armed Services Medical Stock List items. (2) Determinations are simultaneously performed in duplicate, with usually enough blood remaining for repeats or rechecks if necessary. (3) Many specimens can be run at the same time. (4) Determinations can be halted at any one of several stages without danger to the accuracy of results. (5) The procedure can be performed with a satisfactory degree of accuracy by the average careful laboratory worker.

This modified Kingsley technic was found to be more useful than the popular aeration method of Bogan,[3] because simplicity and speed were gained without sacrifice of accuracy. Similarly, it is less complicated and less time-consuming than the method of Harger.[4] Before adopting the method as described, numerous trials were conducted to compare its results with those of the two other methods mentioned. Results were gratifying, as were those in determining known amounts of ethyl alcohol added to blood. Reports from the laboratory services of Army hospitals in Europe, where this method was adopted, were most favorable.

Principles on which are based the numerous methods for the determination of ethyl alcohol in blood and other body tissues have been reviewed most thoroughly by Gonzalez and associates.[5] These principles, five in number, are (1) oxidation to acetic acid, (2) mild oxidation to acetaldehyde, (3) conversion of ethyl alcohol to ethyl iodide, (4) conversion of ethyl alcohol to ethyl nitrate, and (5) determination of the physical properties of the distillate. Methods of choice for routine clinical use are those based on the principle of oxidation of the ethyl alcohol to acetic acid, with, of course, a simultaneous reduction of the dichromate (in sulfuric acid) oxidizing agent.[6] The acetic acid can be distilled over and titrated with standard alkali; the amount of oxidizing agent reduced by the alcohol can be determined by back-titration of the excess dichromate with an iodine-sodium thiosulfate, or similar, solution;[4] or the extent of reduction of the dichromate-sulfuric acid solution also can be determined colorimetrically. Such colorimetic adaptation has been found useful for routine work in most medical laboratories of the Armed Forces.

In methods for the determination of ethyl alcohol based on measuring the extent of reduction of dichromate, it must be realized that we are actually determining the "total volatile reducing substances," and expressing them as ethyl alcohol. Some clinical

chemists and toxicologists give as a parallel the determination of chlorides by the silver nitrate method, pointing out that we are actually determining the "total halides," and expressing them as chlorides. Or, in the determination of "blood sugar" by the classical technics of reducing an alkaline copper reagent, the "total reducing substances" in the blood filtrate are actually measured and expressed as "glucose." Theoretically, therefore, blood alcohol determinations by methods such as that presented can have disadvantages. However, in practice, these are relatively few. In methods based on dichromate reduction, the presence of "acetone bodies" can cause false high results. Fortunately, these substances are not found to any degree in the blood of healthy young service people, and, in diabetics, must be dangerously high to materially affect results of analysis. Such cases of diabetes are usually so suspected by the clinician, or the presence of acetone can be detected in blood or urine by classical methods. By using methods based on the same principle as the one described in this report, Jetter[7] reported that the highest value for acetone in terms of ethyl alcohol obtained from seven patients with diabetes who had a "plus 4" acetone in the urine was only 0.3 mg per ml. Methyl alcohol must be detected by other means of toxicologic analysis, because it will reduce the dichromate-sulfuric acid agent. Formation of volatile reducing substances, from putrefaction of blood, can be avoided by the use of fluoride as an anticoagulant. The presence of such putrefactive products, formed in aged specimens when fluoride has not been added, can readily be detected by their odors on opening the vial. Hence, the importance of a "sniff" test as part of the determination. The danger due to reduction of the dichromate-sulfuric acid solution by dirt and other impurities can be overcome by careful laboratory technic. For methods based on this principle, allowance is usually made for the presence of small amounts of nonethanol volatile reducing substances, which can occur normally in blood, by considering values so obtained up to and including 0.5 mg per ml as "inconclusive."

DISCUSSION

As one performs blood alcohol determinations over a period of years, and at the same time has access to reports of clinical symptoms, it becomes strikingly evident that, in the vast majority of cases, the clinical state of intoxication and the blood alcohol level are closely related.

In post-mortem cases where blood of the peripheral venous type can be obtained at autopsy and the ethyl alcohol content thereof compared with the ethyl alcohol content of the brain,[8] the ratio (blood alcohol:brain alcohol) of 1.2 ± 0.2 is observed with surprising frequency. That is:

$$\frac{\text{Mg ethyl alcohol per ml whole blood}}{\text{Mg ethyl alcohol per gram brain tissue}} = 1.2 \pm 0.2$$

Significant deviations from this rule are to be found mostly in "borderline" cases of intoxication.

That the brain alcohol concentration is the most reliable index of alcohol intoxication, from the laboratory standpoint, has been fully established and accepted for some time by authorities on the subject. The close correlation, by ratio, between peripheral venous blood alcohol concentrations and brain alcohol concentrations[9,10] can only serve to enhance the value of blood alcohol tests as an aid in the diagnosis of alcoholic intoxication.

The subject of accuracy (the concurrence between the true value and the measured value) in blood alcohol determinations is often broached in an effort to cast doubt as to the worth of the test. One can only look at this question as one considers other laboratory examinations, particularly those of a quantitative chemical nature. The axiom: "Clinician, know thy laboratory" can apply here as well as to other laboratory tests, and perhaps more so due to the narrower margin of permissible analytical error, and the possible medico-legal implications. The maximum permissible error in blood alcohol determinations should never exceed ± 0.2 mg per ml, with a more precise limit of ± 0.1 mg per ml as the goal. That these limits can be attained, particularly the latter, was shown by the performance of some U. S. Army hospital laboratories in Europe on blood alcohol proficiency surveys.

A few statements on the matter of the significance of blood alcohol values can be included here which may be of interest to all professional officers of the medical services of our Armed Forces. Unfortunately, too much stress and blind dependence is sometimes placed on "tables of values," such as that appearing in a most useful and valuable book of laboratory methods.[3] In that table definite narrow ranges of values can be construed by some to mean definite states of intoxication for all persons whose blood alcohol values fall within that range. Such a table may well be used as a guide, but for it to be used, particularly by unqualified and uninformed persons, as a hard and rigid yardstick is most distressing. If we combine the possible "inconclusive" factor of 0.5 mg per ml of blood (in methods based on dichromate-sulfuric acid reduction) with the possible laboratory error of "± 0.2 mg per ml," we can see the dangers of such hair-splitting interpretations. In "borderline" cases of alcoholic intoxication, that is, when blood alcohol levels are in the range of 0.5 - 1.5 mg per ml, similar blind and rigid treatment becomes even more serious.[11,12] Paragraph 11 of Special Regulations 600-140-1, dated 18 July 1951, entitled "Personnel" and concerning "Line of Duty Determination," states: ". . . a blood alcohol test is only a medical

officer's aid in diagnosis, and will not be interpreted by nonprofessional individuals."

An interesting comparison of chemical and clinical observations for alcoholic intoxication can be seen in table 1.[12] This comparison presents the results of studies by Jetter[7] on 1,150 cases of alcoholism observed at a large civilian hospital, and those of Newman and Ashenburg[13] on 500 similar cases seen at a Navy activity. In Jetter's study, the clinical criteria essential for diagnosis of clinical intoxication was that gross gait abnormality had to be present, and in addition, at least two of the following: odor of alcohol on the breath, abnormality of speech, flushed face, and dilated pupils. In the study of Newman and Ashenburg, the men marked "intoxicated" were those the examining medical officer declared "unfit for duty," with no specific criteria mentioned. We must consider the well-known fact that there is considerable variation in the tolerance of different persons for ethyl alcohol. The difference in results seen in the table for groups having blood alcohol levels of 1.0, 1.5, and 2.0 mg per ml can most likely be explained by the fact that Jetter's study undoubtedly included men and women of varying physical conditions and ages. On the other hand, in the study by Newman and Ashenburg most of the subjects were young, healthy servicemen.

SUMMARY

The method used by a large central Army medical laboratory for processing submitted specimens and reporting results of blood ethyl alcohol levels is described. A report form is illustrated. Such a form calls for the observations and opinions of the examining physician and for the laboratory results of the blood alcohol determination.

The method of Kingsley (microdiffusion in an autoclave), modified to use standard items found in the Armed Services Medical Stock List, 1954, is used. Stock numbers are given for all items, and the more common sources of error encountered in the analysis are outlined. Speed, simplicity, and a very reasonable degree of accuracy for routine clinical use are among the advantages of the method as described.

Five principles on which are based most methods for the determination of ethyl alcohol in body fluids are listed. Use of the principle of reduction of dichromate-sulfuric acid solutions seems the most popular technic for routine use. Several theoretical and practical aspects of such methods are discussed.

Correlation between blood alcohol levels and recorded clinical symptoms of intoxication is evident in the majority of cases. A ratio of blood alcohol to brain alcohol of 1.2 ± 0.2 is observed in post-mortem cases. A limit of error of ± 0.1 mg per ml should be sought after in all Armed Forces medical laboratories in blood

TABLE 1. *Comparison of chemical and clinical observations in two studies of acute alcoholic intoxication**

Alcohol (mg/cc whole blood)		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
Percentage of men intoxicated	Jetter**	10.5	18.5	47	83.6	90	95.1	96	93.3	100
	Newman and Ashenburg***	10.3	7.9	22.1	34.9	80.5	100	95	100	100

* From page 744 of reference 13.
** 1,150 cases.
*** 500 cases.

alcohol determinations, and a limit of error of ± 0.2 mg per ml should never be exceeded.

The rigid interpretation of the results of blood alcohol determinations is to be avoided, and the "official interpretation" is the responsibility of the physician, if and when he sees fit to use the results of the laboratory test as a diagnostic aid.

Results of a comparison of two studies of clinical and chemical tests for alcoholic intoxication are referenced in order to stress the dangers of blind dependence on blood alcohol levels, particularly in "borderline cases."

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Colloid chemistry is the twilight between chemistry and physics—but that is where God has chosen to reveal Himself.—Martin T. Fischer

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ORIGINAL ARTICLES.

ATTENTION GYNECOLOGISTS!—NOTES FROM THE DIARY OF A FIELD AND HOSPITAL SURGEON, C. S. A.

By L. G. Capers, M. D., Vicksburg, Miss.

How common it is now-a-days, and how natural, too, for men to tell wonderful stories about "the war"; their desperate charges; hair-breadth escapes; numbers who have fallen victims to their feats of personal valor, etc., etc. Then every surgeon has performed any number of wonderful operations before unheard of in the annals of surgery!

Until the present moment, I have refrained from bringing before the public, and more particularly the Profession, any of my daring exploits or remarkable surgical procedures; and even now I feel a delicacy in offering the following remarkable case, the relation of which is prompted only by a sense of duty to my professional brethren. Doubtless many will pronounce the facts to be presently related as unusual or impossible; to such I need only say, if not, why not?

Here are the proofs:

On the 12th day of May, 1863, the battle of R. was fought. Gen. G.'s brigade met the advance of Grant's army, under Gen. L., about one mile from the village of R. About three hundred yards in rear of my regiment was situated a fine residence, the occupants being a matron, her two daughters, and servants (the host being absent in another army). About 3 o'clock P. M., when the battle was raging most furiously, the above-mentioned lady and her two daughters (aged respectively fifteen and seventeen), filled with interest and enthusiasm, stood bravely in front of their homestead, ready and eager to minister to their wounded countrymen should they fall in the dreadful fray.

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Our men were fighting nobly, but pressed by superior numbers, had gradually fallen back to within one hundred and fifty yards of the house. My position being near my regiment, suddenly I beheld a noble, gallant young friend staggering closer, and then fall to the earth. In the same moment a piercing scream from the house reached my ear! I was soon by the side of the young man, and, upon examination, found a compound fracture, with extensive comminution of the left tibia; the ball having ricochetted from these parts, and, in its onward flight, passed through the scrotum, carrying away the left testicle. Scarcely had I finished dressing the wounds of this poor fellow, when the estimable matron came running to me in the greatest distress, begging me to go to one of her daughters, who, she informed me, had been badly wounded a few minutes before. Hastening to the house, I found that the eldest of the young ladies had indeed received a most serious wound. A minnie ball had penetrated the left abdominal parietes, about midway between the umbilicus and anterior spinal process of the ilium, and was lost in the abdominal cavity, leaving a ragged wound behind. Believing there was little or no hope of her recovery, I had only time to prescribe an anodyne, when our army fell back, leaving both field and village in the hands of the enemy.

Having remained with my wounded at the village of R., I had the opportunity of visiting the young lady the next day, and, interruptedly, for a period of nearly two months, at the end of which time she had entirely recovered, with no untoward symptoms during treatment; save a severe peritonitis, she seemed as well as ever!

About six months after her recovery, the movements of our army brought me again to the village of R., and I was again sent for to see the young lady. She appeared in excellent health and spirits, but her abdomen had become enormously enlarged, so much so as to resemble pregnancy at the seventh or eighth month. Indeed, had I not known the family and the facts of the abdominal wound, I should have so pronounced the case. Under the above circumstances, I failed to give a positive diagnosis, determining to keep the case under surveillance. This I did.

Just two hundred and seventy-eight days from the date of the receipt of the wound by the minnie ball, I delivered this same young lady of a fine boy, weighing eight pounds. I was not very much surprised; but imagine the surprise and mortification of the young lady herself, her entire family. This can be better imagined than described. Although I found the hymen intact in my examination before delivery, I gave no credence to the earnest and oft-repeated assertions of the young lady of her innocence and virgin purity.

About three weeks from the date of this remarkable birth, I was called to see the child, the grandmother insisting there was "something wrong about the genitals." Examination revealed an enlarged, swollen,

sensitive scrotum, containing on the right side a hard, roughened substance, evidently foreign. I decided upon operating for its removal at once, and in so doing, extracted from the scrotum a minnie ball, mashed and battered as if it had met in its flight some hard, unyielding substance.

To attempt to picture my astonishment would be impossible! What may already seem very plain to my readers, as they glance over this paper, was, to me, at the time, mysterious. It was only after several days and nights of sleepless reflection that a solution flashed before me, and ever since has appeared as clear as the noon-day sun!

"What is it?" The ball I took from the scrotum of the babe was the identical one which, on the 12th of May, shattered the tibia of my young friend, and in its mutilated condition, plunged through his testicle, carrying with it particles of semen and spermatozoa into the abdomen of the young lady, then through her left ovary, and into the uterus, in this manner impregnating her! There can be no other solution of the phenomenon! These convictions I expressed to the family, and, at their solicitations, visited my young soldier friend, laying the case fully before him in its proper light. At first, most naturally, he appeared skeptical, but concluded to visit the young mother. Whether convinced or not, he soon married her, ere the little boy had attained his fourth month.

As a matter of additional interest, I may mention having received a letter during the past year, reporting a happy married state and three children, but neither resembling, to the same marked degree, as the first—our hero—Pater familias!

"The best theory is that which necessitates the minimum number of assumptions to unite the maximum number of facts, since such a theory is most likely to possess the power of assimilating new facts from the unknown without damage to its own structure. Our facts must be correct; our theories need not be if they help us to discover new facts, even if these discoveries necessitate some changes in the structure of the theory."

—HANS SELYE
in *Science*, p. 631, Oct. 7, 1955

MEDICAL ASPECTS OF A HURRICANE DISASTER IN MEXICO

JOHN J. GORDON, *Lieutenant (MC) USN*
RICHARD E. LUEHRS, *Commander (MC) USN*

THE PERSONNEL of the United States Navy, like their minuteman ancestors, responded immediately to the call for help made by the Mexican government in the recent disastrous hurricane and flood in the Tampico area. Task Group 84.7 was formed as a disaster relief force under the command of Rear Admiral Milton E. Miles, USN, Commander Panama Sector Caribbean Sea Frontier, and ordered to the disaster area with all possible speed.

Hurricane "Janet" had first struck Belize in British Honduras. It then crossed the Yucatan Peninsula, and hit Tampico to the north, creating around the latter a huge flood area involving the entire Tamisi and Panuco River basins and Tampico. Wind and rain collapsed residential dwellings, brick buildings, and huge oil storage tanks in a brief six-hour period on Sunday night, 19 September. The mass of water carried by Hurricane "Janet" into the basin north, west, and south of Tampico inundated 3,000 square miles of lowland to a depth of 12 to 18 feet.

As the water rose, people sought high ground or rooftops, both too often inadequate. About 800 people lost their lives in the flood, and thousands of cattle were washed to their deaths in the swirling waters. The southern and western portions of Tampico proper were inundated, and an estimated 5,000 to 6,000 people were marooned on their roofs. Water velocities in some of the streets were conservatively estimated at from 15 to 18 knots—too great for any effective rescue by boat.

At 0700 hours Friday, 30 September 1955, 12 doctors and 24 corpsmen from the School, Hospital, and Dispensary of this Station, and from the U. S. S. *Saipan,* together with personnel (flight instructors and ground crews) of Helicopter Training Unit No. 1, were dispatched from Pensacola, Fla., to Tampico aboard the U. S. S. *Saipan.* Medical supplies for medical and surgical emergencies as well as long-term medical aid were prepared in large field kits and the medical teams were assembled.

From U. S. Naval School of Aviation Medicine, U. S. Naval Air Station Pensacola, Fla.

After a helicopter survey of the disaster area late on 1 October, headquarters were established ashore at the Tampico Golf Club. The course had two fairways within 150 yards of the clubhouse that were ideal for helicopter operations. Emergency medical watches were set on these strips as operations began. All food and medical supplies for the operation were lifted from the carrier by helicopters and stockpiled at the landing strip. U. S. Air Force and U. S. Marine aircraft were used in stockpiling additional supplies at the municipal airport, where a Navy physician and four corpsmen maintained round-the-clock duty.

From the outset the Mexican medical representative assured us that they were ready and able to take care of their own people with Mexican doctors and nurses. Their prime need of course was transportation, but some medical aid was given also. Through the entire operation there was a most excellent spirit of unity of purpose and work.

The Navy medical group co-ordinated the medical teams with the flight operations, checked the pilot debriefing reports, and funneled the teams out to the areas involved. Additional area reports were received and evaluated from Mexican civilian planes operating from the nearby Tampico airport. Needed medical supplies were given to the Mexican doctors and nurses.

In the first six days of the operation Mexican medical teams flew 40 missions. To assist them in these first urgent days Navy doctors flew 31 medical missions from 20 to 80 miles back into the flood areas and saw about 1,200 patients. An eight-year-old girl with a complete fracture of the left femur was evacuated by helicopter. One woman gave birth to a baby boy while airborne. Another woman was lifted by sling from a Tampico rooftop into a helicopter, and delivered a healthy full-term boy in the hospital late the next day. Most of the medical cases existed prior to the flood, but surgical cases were emergency in type.

The preventive medicine activities necessary to maintain our own personnel ashore were established at the beginning of the operation. Daily sanitary inspections of messing facilities were made. The clubhouse was screened in securely. The swimming pool was used as a reservoir and a portable gasoline pump connected for showers and commodes. The water was treated and tested for 1.5 p. p. m. chlorine residual and water hours were established. A pit latrine was constructed for use in case the water supply should be exhausted.

The continuing rise of water through the fourth day forced temporary abandonment of all activities save simple lifesaving evacuation from hazardous areas. This intensive lifesaving phase lasted two days. On the fifth day the U. S. S. *Saipan* dispatched

boat crews to the beach with 245 officers and men, including 6 Navy medical officers, to conduct evacuations from the flooded parts of Tampico. Lifelines were rigged across flooded streets and people were helped to dry ground. One seaman fractured his leg in the very strenuous battle against the current in the streets. He was transported safely to the *Saipan* for treatment.

As evacuees arrived at the country club site they were screened, those who were ill being sent to the medical-aid tent where they were treated by Navy and Mexican doctors. The others were given food and evacuated by bus to tent areas that had been set up in town by local authorities. After immediate medical aid, ill persons were moved by ambulance to the local hospitals.

Screened, pit-type latrines were built, sprayed with DDT, and sprinkled with quicklime twice a day.

As the waters began to recede, the original operation involving scouting flights, food drops, and medical missions resumed. Rice, beans, and corn were dropped by parachute from Marine aircraft, after an interpreter had landed and briefed the refugees on the procedure for a drop.

The Navy teams of doctors and corpsmen, in conjunction with Mexican doctors and nurses, began an intensive typhoid and diphtheria-pertussis-tetanus inoculation program at the 50 or 60 immunization units set up in Tampico. As persons appeared for their inoculations, they began to bring sick family members along for treatment; so what was begun as an inoculation program became a clinical program by the press of circumstances. A total of 54,000 inoculations were given, and Navy corpsmen and physicians examined and treated between 1,600 and 1,700 children and adults in downtown Tampico (table 1). One Navy doctor and two Mexican nurses traveled by boat and jeep to communities south of Tampico and in one day treated 300 people.

Large amounts of halazone, high test hypochlorite, and sodium hypochlorite, with directions for use printed in Spanish, were distributed in town through the local health authorities and in surrounding areas by helicopter, in order that the people would have at least one quart of safe water a day per person.

As the acute danger of the flood passed, chemical-spray teams, water purification units, and field kitchens from Panama and from Corpus Christi, Tex., moved in. These were staffed by Navy and Marine personnel trained in their use. Surveys by helicopter and horseback were conducted, and the units were put into operation at strategic sites in Tampico and surrounding areas. The entire town of Tampico was sprayed with DDT and chlordane by Navy and Mexican personnel to control flies and mosquitoes.

TABLE 1. *Medical activities in Tampico area disaster from 2 to 16 October 1955*

Activity	Number
Pounds of medical supplies expended	7,995
Number of medical missions flown	127
Treatment in outlying areas	
Persons treated	5,077
Persons treated by Mexican doctors	3,950
Persons treated by Navy doctors	1,027
Persons inoculated by Mexican doctors	903
Treatment in Tampico area	
Persons treated by U. S. naval personnel	1,621
Persons inoculated	54,000
By Mexican doctors	40,000
By U. S. naval personnel	14,000

A fleet of six amphibious landing craft, with Navy crews, one Mexican doctor, and food and medical supplies aboard, made their way up the Tamisi and Panuco Rivers to supply more food and medical attention to these areas.

All reports from Mexican doctors and nurses going into the field showed that there was no increase in endemic malaria and typhoid fever up to 17 October, the period covered by this report.

The helicopter pilots from Helicopter Training Unit No. 1 and U. S. Marine Air Group 26 (which came from Cherry Point, N. C., aboard the U. S. S. *Siboney* (CVE-112) on 9 October 1955) flew long, exhaustive, and exacting missions. In the first 5 days of operations, Helicopter Training Unit No. 1 had logged nearly 50 hours per man. Table 2 summarizes the activities of these two groups during the emergency. Flight proficiency was watched closely during landings, take-offs, and periodic hops. After the

TABLE 2. *Operational statistics*

Activity*	HTU-1	MAG 26	Total
Day sorties	2,298	1,205	3,503
Night sorties	88	13	101
Reconnaissance sorties	165	50	215
Hoist evacuations	2,434	11	2,445
Pounds of food delivered	184,037	124,446	308,483
Evacuations	3,737	16	3,753
Medical Team hops	81	46	127
Pounds of medical supplies delivered to outlying areas	1,861	2,000	3,861

*Aircraft runs from Monterey and Corpus Christi to Tampico carried in 1,738 tons of food and medical supplies. Included in this figure is 2,500 pounds of assorted medical supplies airlifted in to run the Tampico Charity Hospital for two weeks.

sixth day of operations the flight schedule became less prolonged and less grueling, but all pilots continued the heavy schedules except one who was grounded because of illness.

The foodstuffs most required by the people in the area were corn, beans, and rice. Our "C" rations were accepted, but often with reluctance and with some wastage.

Important military medical lessons that may be learned from this operation are:

1. Effective medical aid to foreign nationals requires interpreters to assist the physicians in their work.

2. Training given naval flight surgeons in the role of pilot's assistant in helicopter rescues is invaluable, re-emphasizing the importance of this aspect of aviation medicine.

3. A cross file of the linguistic abilities of naval personnel can be of great value in emergency actions.

REPORTING DRUG ALLERGIES

Drug manufacturers have well assumed full responsibility for introducing new drugs into clinical use with careful control of toxic and allergic symptoms. Naturally, drug manufacturers want their new drugs to go over well. Nevertheless, they are wise, as experience abundantly shows, in calling attention repeatedly to the possibility of unfavorable reactions, when these are reported.

This increasing sense of responsibility on the part of drug manufacturers imposes additional obligations on physicians to report clearly and fully all cases of unsatisfactory responses to drugs. These may be reported directly to the drug manufacturers in the case of new drugs. When old and commonly used drugs are involved, the reports might be made through state medical journals. It might be wise indeed for state medical societies to issue annual reports on drug toxicity, through standing committees appointed to deal with this continuing problem.

CHAUNCEY D. LEAKE, Ph. D.
in *Postgraduate Medicine*
p. 132, Feb. 1955

THE CONTINUING MILITARY PROBLEM OF RHEUMATIC FEVER

DAVID B. CARMICHAEL, *Lieutenant Commander (MC) USN*

THE increased incidence of acute rheumatic fever among military personnel undergoing training during the period of the Korean conflict emphasized some of the problems with which this disease confronts the Medical Department. During World War II bitter experience with this problem resulted in extensive research programs, special hospitals, and adjustments in training technics. Subsequent disability claims filed with the Veterans Administration by veterans with rheumatic heart disease accentuated the problem in the postwar period. Observation and research during World War II clarified the criteria for diagnosis of this entity, established the relationship between the disease and infection with hemolytic streptococci, and pointed out the necessity for prolonged hospital treatment.

During the period from 1946 through 1950 the convalescent hospitals were closed, many experienced medical personnel were released to inactive duty, and the decreasing number of recruit trainees took some of the emphasis from the military aspects of this problem. Military research in rheumatic fever, however, continued in several centers of military medicine, and many observations made during World War II were revised and extended. Major units of research have concerned themselves with epidemiologic and immunologic studies of the streptococcus, the feasibility of prophylactic antibiotics during the initial weeks of military training, and advances in the practical therapy of the disease. In spite of such ambitious investigations intc cause and treatment of acute rheumatic fever, however, the expanded training program beginning in 1950 reiterated the gravity of the problem.

MATERIAL, METHODS, AND RESULTS

During the period from 1 January 1952 to 30 November 1953, 161 male military personnel, representing a total of 170 attacks of acute rheumatic fever, were admitted to the U. S. Naval Hospital, Great Lakes, Ill. The study was continued for the following 13 months at the U. S. Naval Hospital, San Diego, Calif., where between 1 December 1953 and 30 December 1954, 141 men were

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admitted with 142 episodes of rheumatic fever. These 302 patients were predominantly members of the Navy and Marine Corps, although Army and Air Force men were admitted from nearby bases. All were hospitalized on wards restricted to the care of patients with rheumatic fever. In each instance the diagnosis was established on the basis of generally accepted criteria.

Table 1 records the monthly incidence of case admissions during the study. In the period under review, the incidence of recruit trainees afflicted with this entity was disproportionately high. Of 302 patients, 259 (85.7 per cent) were undergoing recruit training or were on their "boot" leave at the onset of the disease. At Great Lakes, where the military population was relatively stable, strength statistics of the various commands accentuated the high incidence of illness during the initial training period (table 2). The age of the patients at the time of each admission is recorded in table 3. Over 89 per cent of the patients were 21 years of age or younger.

TABLE 1. *Number of hospital admissions for rheumatic fever by month* in 302 patients*

Month	Number of admissions in			Total
	1952	1953	1954	
January	2	1	9	12
February	11	27	21	59
March	16	20	40	76
April	9	16	38	63
May	14	10	7	31
June	18	7	8	33
July	11	3	7	21
August	0	0	7	7
September	1	0	1	2
October	0	0	0	0
November	0	0	1	1
December	4	2	1	7
Total	86	86	140	312

*Great Lakes: January 1952 through November 1953
San Diego: December 1953 through December 1954

Antecedent respiratory infection was recorded in 225 (74.5 per cent) patients, although protocols occasionally failed to note this information. "Sore throat" occurred 165 times, "upper respira-

tory infection" appeared 47 times, and "chest cold" was noted on eight occasions. Pneumonia occurred once, dental infection once, and a dental extraction preceded the acute illness in three patients.

TABLE 2. *Military population at Great Lakes, Ill., by month for 1952 and 1953*

Month	Recruit strength		Other commands	
	1952	1953	1952	1953
January	17,418	7,177	13,633	11,903
February	18,096	5,640	13,517	13,417
March	16,252	4,497	13,517	13,278
April	13,992	4,551	13,839	12,186
May	12,482	3,373	13,525	12,033
June	13,201	5,228	13,265	11,807
July	11,060	3,010	13,065	11,448
August	9,670	3,012	13,273	10,923
September	6,450	2,141	14,043	10,649
October	4,780	1,923	13,108	10,479
November	4,686	1,779	12,789	10,157
December	6,673		12,385	

TABLE 3. *Age of patients when admitted for rheumatic fever*

Age	Admissions
17	59
18	76
19	79
20	47
21	20
22	12
23	7
24	5
Over 24	4
Not recorded	3
Total	312

The duration of hospitalization averaged 104 days per man. This amounted to a total of 32,487 man-days lost to the military service by this group of patients.

Sixty-eight (22.5 per cent) of the patients gave a positive past history of acute rheumatic fever; 21 (6.95 per cent) had previous illnesses strongly suggesting the rheumatic syndrome. Twenty-four of the 68 patients with a positive past history had suffered an attack of active rheumatism within two years of admission to the sick list. One man had reported for induction immediately upon release from the care of a civilian hospital where he had been undergoing treatment for rheumatic activity.

One hundred and twenty-nine (42.7 per cent) of the men were released from the military service by medical discharge. All but seven of this group were retired because of cardiac disability. Of these seven, four were separated because of concomitant rheumatoid arthritis; one with tuberculosis; one with chronic nephritis; and one following neuropsychiatric evaluation.

In addition to those with true acute rheumatic fever, 38 patients in whom the diagnosis was eventually changed from acute rheumatic fever to some other clinical entity were seen during the initial 23 months of the study. From a military standpoint these men comprise a part of the problem. Their illnesses represented 2,009 man-days of hospitalization, and averaged 53 days per man.

DISCUSSION

The military problem presented by rheumatic fever starts before induction or enlistment. Should the man who has had one attack of rheumatism be inducted? Present regulations exclude from enlistment men with rheumatic valvular lesions and those with a history of active rheumatic fever within two years preceding induction. Many authorities feel that an authenticated history of this disease should be cause for rejection from military service. Of the 89 men with either an authenticated or suspected history of rheumatic fever, 47 had suffered the latest acute episode within five years before induction. Changing the regulations to exclude men with a history of activity within five years would eliminate some of the "poor risk" candidates but would not eradicate the problem. I believe that any man with a proven history of acute rheumatic fever should be rejected from service. In any event, the high incidence of recurrences suggests that no man relating a history of rheumatic fever should be exposed to recruit training without antibiotic prophylaxis.

The adequacy of the induction cardiac examination also cannot be overstressed. The detection of a cardiac murmur of any type should be made a matter of record. Such men should then have a complete cardiac history and examination, including such ancil-

lary measures as electrocardiography and fluoroscopy, for example, when the diagnosis remains in doubt. In 39 instances adequate screening would have excluded men who did not conform to the existing minimum standards for induction.

There remains no satisfactory method of screening men who conceal a history of active rheumatic fever, although careful questioning of any man with a cardiac murmur or unusual cardiac configuration on the roentgenogram will often reveal a strongly suggestive history.

Statistics show that when men report to an induction center for their initial training period the risk of their developing acute rheumatic fever increases.[1-3] The physical and emotional stress, the crowding, and the gathering together of men from different environments all contribute to an increased number of streptococcic infections and an increased incidence of rheumatism.

A third problem is one of diagnosis. For various reasons men undergoing military training will hide symptoms of moderate intensity, while others will exaggerate minor and insignificant complaints. In this study a large number of cases occurred during the "boot" leave awarded the men at the end of recruit training. Usually this leave involves a strenuous trip, late hours, and indulgences beyond the average, and it can be assumed that an attack of rheumatic fever would receive late attention. A careful history in such cases usually revealed that diagnostic symptoms antedated the leave period, but the men failed to report them in order not to jeopardize their hard-earned freedom from military regulation. Conversely, every medical officer is ruefully aware of the "goldbrick" who religiously attends each sick call and presents confusing complaints that often simulate acute rheumatic fever. These problems will be solved only when every medical officer becomes aware of the clinical picture of acute rheumatic fever in the young adult. This study indicated that very few admission diagnoses were inaccurate. It was true that the syndromes of angioneurotic edema, ligamentous strain, and others were considered by medical officers initially observing a patient, but it was also gratifying to observe that in such cases a note to "rule out rheumatic fever" accompanied the man to the hospital.

At the present time the problems in treating of this disease differ little from those in civilian medicine. Perhaps the military physician has a better opportunity to control his patient than does the civilian doctor. It is not the burden of this report to discuss the prevailing opinions as to therapy. In this series the majority of patients were treated with salicylates.

After adequate therapy of the episode of acute rheumatism it devolves upon the ward medical officer or medical board to decide

which patient should be returned to duty and which should be sent to the physical evaluation board. In the case of the patient left with evidence of rheumatic valvulitis the decision is not difficult, and except under extremely unusual circumstances such patients will be referred to the physical evaluation board with the recommendation that they be discharged. For the patient other than the recruit, who recovers from a mild monocyclic first episode of rheumatic fever apparently unattended by residual cardiac damage, the problem is also seldom difficult. These patients will be returned to duty on chemoprophylaxis following a satisfactory convalescent period. Between these two extremes lie a large number of problem cases demanding perceptive medical judgment. No unanimity of opinion among civilian and military authorities is apparent. In 1943 Coburn[4] attempted to classify such marginal cases by assigning numerical values for categories of age, severity of rheumatic attack, extent of residual cardiac damage, and apparent degree of susceptibility. This scale was applied against the cases in this series and in general it followed the pattern of our recommended disposition of cases. Even with this technic, however, a problem group remained.

Experience with the patients reported in this series, opinion by authorities in the field of cardiac disease, and the natural history of the disease have led me to these general conclusions concerning the marginal group:

1. The patient experiencing a second episode of acute rheumatic fever should be discharged from military service.

2. The disposition of the recruit patient, in whose training the investment of the government is minimal, hinges upon whether or not it is felt that any recruit should be returned to duty following rheumatic fever. It is my opinion, and that of authorities conversant with the military problem of rheumatic fever, that patients in whom carditis has appeared should be discharged. Opinion differs among authorities as to the disposition of the recruit with the disease but without the usual clinical findings of valvulitis. Return to duty on consistent penicillin prophylaxis has been proposed by some consultants, while others would discharge such patients to civilian life. It has been suggested that these patients could be discharged with minimum disability payments that would automatically be cancelled if valvular deformity cannot be demonstrated three years after convalescence. In any event the recruit who recovers from rheumatic fever and is left with evidence of valvulitis, a residual systolic murmur, recurrent arthralgias, persistently elevated sedimentation rate, residual conduction defect, or poor psychologic adjustment, or who has a severe, polycyclic disease should be promptly discharged.

3. The patient who has completed basic training and has a residual systolic murmur of innocent characteristics and no history of murmur antecedent to the disease should be assigned to a one-year period of limited duty. At completion of the year he should be re-evaluated in a military hospital.

4. The patient beyond recruit level with recurrent arthralgias, poor psychologic adjustment, persistently elevated sedimentation rate, or a residual conduction defect following the acute disease should be assigned to a one-year period of limited duty with re-evaluation at six-month and one-year intervals.

5. All patients should be placed on chemoprophylaxis in accordance with the recommendations of the American Heart Association. The patients should also receive adequate instruction in antibiotic protection for dental extraction, surgical procedures, and upper respiratory infection. Under no circumstances should a man be returned to duty following acute rheumatic fever without the benefits of antibiotic prophylaxis.

This study reiterates the previous experience with the extremely high and disproportionate incidence of acute rheumatic fever among recruits. Strong consideration should be given to antibiotic protection of men during the first months of military life. By virtue of the high recurrence rate it seems clear that during the period of initial training a program of antibiotic protection with one of the new long-acting penicillin compounds should be given to all recruits with a past history of rheumatic fever. The studies of selected companies of recruits carried through recruit training under antibiotic prophylaxis should continue, and as long-acting compounds become available serious consideration should be given to prophylactic treatment of all recruits.

The position of restorative cardiac operations for the military man with service-incurred rheumatic valvulitis cannot presently be assessed. After the long-term results of commissurotomy will have been evaluated it is not beyond hope that experienced military personnel can be maintained on a limited duty status until such time as commissurotomy could again place them on the effective list.

SUMMARY

Analysis of 302 cases of rheumatic fever among male service personnel occurring in a three-year period showed that:

The average duration of hospitalization was 104 days per man. These 302 patients were hospitalized for a total of 32,487 days before disposition could be effected. Of these cases, 85.7 per cent occurred among men undergoing recruit training, 42.7 per

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cent were discharged from the service for medical reasons, and 29.4 per cent gave a definite or suggestive past history of rheumatic fever. A respiratory tract illness antedated the rheumatic fever in three fourths of the group.

The natural history of rheumatic fever and the high recurrence rate strongly suggest that any man with an authenticated history of acute rheumatic fever should be rejected from military service.

The high incidence of rheumatic fever during the adjustment period of recruit training and the proven benefit of prophylactic penicillin indicate that some program of suppression of streptococcic infection with penicillin should be made as much a part of medical care of the recruit as are inoculations against tetanus or typhoid fever.

No man should be returned to unrestricted duty following an episode of rheumatic fever without adequate arrangements for consistent penicillin prophylaxis.

My gratitude is extended to the following authorities for helpful recommendations in the preparation of this report: George C. Griffith, M. D., Col. T. W. Mattingly, MC, USA, Arthur Scherbel, M. D., and Howard B. Sprague, M. D.

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RESEARCH FOR THE PRACTITIONER

There is much darkness in the world of medicine, and light may come from an unexpected quarter, so that the man who is compelled to shift his gaze from one point of the compass to another may be better off than he who is always looking in one direction. It may happen to those wholly engaged in clinical research that they miss the opportunity of seeing in matters outside their scope something of fundamental importance to their inquiries, while to the practitioner chance may offer a new concept of disease from the observation in the same week of two cases which are clearly alike but like nothing else that has ever been seen.

—SIR CHARLES SYMONDS, F. R. C. P.
in *British Medical Journal*
p. 119, Jan. 15, 1955

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Clinicopathologic Conference

U. S. Air Force Hospital, Maxwell Air Force Base, Ala.*

ABDOMINAL PAIN

Summary of Clinical History. A 49-year-old former coal miner was admitted because of abdominal pain of two weeks' duration. Three years before admission he began to experience "weak spells," characterized by generalized weakness and tremor, occurring two to three times a day. Ingestion of food had quickly relieved these symptoms. About the same time he developed a cough, productive of small amounts of white sputum, that was troublesome at night. He also began to develop slowly progressive generalized weakness and mild shortness of breath on walking. He was frequently awakened at night with dyspnea and coughing but never experienced orthopnea. Two weeks before admission he developed a severe, unrelenting, nonradiating pain in the right upper quadrant that increased on coughing and deep breathing. The cough and amount of sputum increased. There had been a 15-pound weight loss in the preceding year.

Three years before admission skin lesions developed on the backs of both hands. One lesion was removed and was said to be "cancerous."

For many years he had had episodes of postprandial eructation and heartburn, usually associated with the ingestion of fried foods. He also had constipation and hemorrhoids. For approximately 20 years he had consumed excessive amounts of alcohol, mainly whisky and beer, but had stopped abruptly three years before admission. His diet had always been adequate. He was once told he had mild diabetes but took no insulin. No history of jaundice, vomiting, melena, or hemoptysis was obtained. At the age of 13 he had had "Bright's disease," and apparently had recovered completely. His father died at the age of 63 of "apoplexy," and his mother died at 60 of a "heart attack." A brother has "heart trouble," a sister has hypertension, and two sisters have had arthritis.

*Col. Emmett C. Lentz, USAF (MC), Commander. From the Medical Service, Lt. Col. Philip G. Keil, USAF (MC), Chief.

Physical Examination. On examination the temperature was 97.4° F; pulse, 120; blood pressure, 130/100 mm Hg; and weight, 215 pounds. The patient was well nourished, appeared older than 49 years, and complained constantly of abdominal pain on deep breathing. The anteroposterior diameter of the chest was increased. There was dullness to percussion over the posterior lower half of the right lung field. On auscultation there were scattered rhonchi and expiratory wheezes which cleared on coughing. The heart was not enlarged. The second sound at the aortic area was greater than that at the pulmonic. There was exquisite tenderness on palpation of the right upper quadrant. The liver edge was palpated 5 cm below the right costal margin. Dilated cutaneous veins were present along the lateral aspects of the abdomen. Genital and rectal examinations were negative. The skin over the dorsum of both hands, extending onto the lower forearm, was covered with discrete brown-to-white encrusted areas, some as large as 2 cm in diameter. A few small spider angiomata were present on the upper thorax.

Laboratory Studies. The urine specific gravity was 1.022, and there were negative tests for albumin, reducing substance, and bile. Examination of the sediment showed an occasional white blood cell per high-power field. A test for urine urobilinogen was positive in a 1:10 dilution. Examination of the blood revealed a white blood cell count of 7,600 per cu mm, with 65 per cent neutrophils. The hematocrit was 50 ml per 100 ml; the sedimentation rate, 26 mm in one hour (Wintrobe). The total blood cholesterol was 229 mg; total proteins, 7.7 g (with an albumin-globulin ratio of 1.8); direct Van den Bergh reaction 1.2 mg; indirect, 0.9 mg; and blood urea nitrogen 78 mg; all per 100 ml. Cephalin flocculation was 1 plus in 48 hours. The prothrombin time was 21 seconds (control, 16 seconds). Sixty-two per cent of bromsulphalein (brand of sulfobromophthalein sodium) dye was retained in 45 minutes. A glucose tolerance test revealed a fasting blood sugar of 65 mg; ½ hour, 100 mg; 1 hour 190 mg; 2 hours, 175 mg; 3 hours, 125 mg; and 4 hours, 150 mg; all per 100 ml. The ½- and 1-hour urine specimens were negative for reducing substance, and the 2-, 3-, and 4-hour specimens were positive (4 plus). An intradermal injection of PPD No. 2 was positive in 24 hours. Alpha-hemolytic streptococcus was the predominating organism on sputum examination. A stool specimen was brown, guaiac negative, and contained no ova or parasites. Roentgenograms of the chest showed bilateral hilar prominence. Chronic diffuse bronchitis was seen on bronchoscopy. Bronchograms showed irregularity of the main branches of the right middle lobe, with some beading present. The radiologist commented that this could represent early bronchiectatic change. The gallbladder was not visualized after an oral ingestion of priodax (brand of iodoalphionic acid).

Course in Hospital. While in the hospital the patient complained continuously of right upper quadrant pain. On the eighth hospital day he began to complain of pain in the right shoulder which was accentuated by coughing and respiration, but there was no change in physical findings.

The pain increased and was controlled only by subcutaneous analgesics. The course was ingravescent. He became weaker, anoretic, and occasionally had nausea and vomiting. On the 13th hospital day the blood pressure became unobtainable and the patient unresponsive. Therapy consisted of intravenous fluids, whole blood, terramycin, and norepinephrine. Blood pressure was maintained within normal limits thereafter, but the patient remained unconscious. Fifteen hours after the onset of shock he quietly died.

DISCUSSION

Doctor Abrams:* May I see the x-ray films first?

Doctor Crabtree:** This is the only chest roentgenogram we have besides the bronchogram (fig. 1). The lungs are clear. The heart is normal

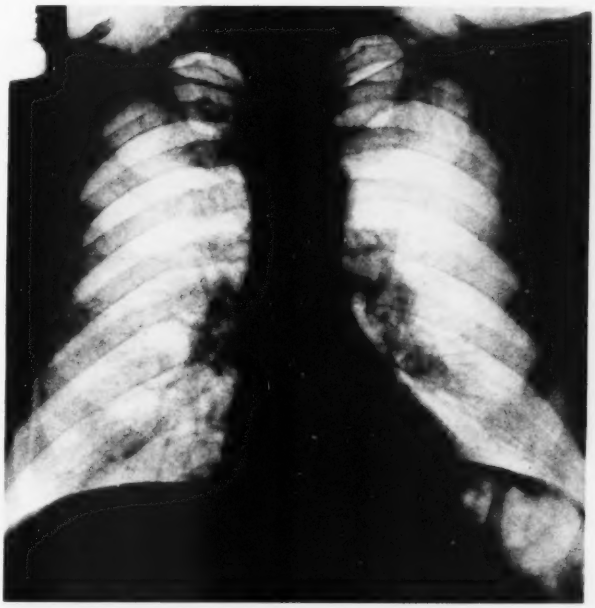

Figure 1. Roentgenogram of the chest showing perihilar adenopathy.

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**Maj. Samuel F. Crabtree, USAF (MC), Chief, Radiology Service.

in size and shape. There is bilateral hilar and paratracheal adenopathy without a cause for that adenopathy being shown on the film. The mediastinum is not enlarged; the trachea is in the midline; the bony thorax shows no evidence of pathologic lesions. The differential in a man who is not sick but who is in a somewhat younger age group than this patient, should definitely include Boeck's sarcoid. However, in view of this man's course, we can exclude this, as well as other benign causes of hilar adenopathy such as erythema nodosum. I think it would be extremely unlikely for the cancerous lesion on the hand to cause this picture in the chest.

This brings us to malignant diseases which might produce this picture. The lymphomas and lymphosarcomas could definitely do this. Also, a bronchogenic carcinoma could produce this picture. However, we have an excellent bronchogram (fig. 2) which shows no evidence of intraluminal disease involving any of the major bronchi. There is early bronchiectasis in the right middle lobe which is of doubtful significance. None of the bronchi are displaced by the hilar and paratracheal

Figure 2. Bronchogram in the left anterior oblique position. Beading is demonstrated along the right middle lobe bronchus.

adenopathy. Lastly, the differential should include metastatic disease from the abdomen. Rarely a subdiaphragmatic malignancy will metastasize via the thoracic duct, obliterate its entrance into the vena cava, producing a Virchow's node, and then by back pressure and collateral channeling produce hilar adenopathy. I do not think that this is the case here, however.

Doctor Abrams: May I ask you if the amount of hilar adenopathy is inconsistent with the man's previous occupation as a coal miner?

Doctor Crabtree: I think so.

Doctor Abrams: You think it is inconsistent with that?

Doctor Crabtree: I do. This is adenopathy without evidence of peripheral pulmonary disease. The gallbladder fails to visualize. This is a film taken after ingestion of priodax.

Doctor Abrams: How many tablets?

Doctor Crabtree: It was the usual dose. I don't see any evidence of disease within the abdomen. The liver may be somewhat large. There is no evidence of bone disease.

Doctor Abrams: In studying this case, I was impressed with the story in the first paragraph of generalized tremor occurring two to three times a day. These events, three years before the patient's present illness, might have been due to attacks of hypoglycemia. If, indeed, such was the case, it would be necessary to determine what was the cause of such hypoglycemia.

There are essentially eight categories in which the production of hypoglycemia is an important factor. One is simply by utilization faster than supply, and the second is inadequate glycogen reserve. Both of these, I think, can be discounted. There are hormonal causes for hypoglycemia, such as adrenocortical insufficiency, adenohypophaseal insufficiency, and hypothyroidism, and these in this case, I think, can be discounted. In certain central nervous system diseases with lesions of the hypothalamus, diencephalon, and brain stem, hypoglycemia occurs, and this category, I think, also can be discounted. Hypoglycemia occurs as an exaggerated response to alimentary hyperglycemia, as a Hamman-Herschfeltor reaction. This is seen in postgastroenterostomy or postgastrectomy syndromes.

Then there are a large number of cases of functional hypoglycemia due to autonomic nervous system imbalance. Characteristic in the functional type is a glucose tolerance curve which is low between the two- and four-hour period and shows a return to normal in four hours. There is also no response in this type to a carbohydrate fast. The glucose tolerance curve given here follows a curve that will fall better into one of the other categories. Then there is, of course, factitious hypoglycemia due to self-administration of insulin.

Finally, we come to the two last categories that we always consider as causes of hypoglycemia in a differential diagnosis, while sometimes forgetting the first six. The first is due to a hypersecretion of insulin, either from an insulinoma (adenoma or carcinoma) or from diffuse islet cell hypertrophy. In these there is an increased insulin type of hypoglycemia and the fasting blood sugar is usually less than 50 mg per 100 ml. There is, of course, no tolerance to a carbohydrate fast, and rapid recovery results from the administration of dextrose. Mirsky and associates[1] not long ago devised a very important diagnostic test, which in this condition involves the recovery of insulin from the urine. In cases of increased insulin secretion, the urinary insulin is regularly increased. The normal value for this test is 0.16 of a unit secreted in a 24-hour period.

Now, the last great category is hepatogenous hypoglycemia. We find this associated with cirrhosis and fatty degeneration, hepatoma, carcinomatosis, and toxic hepatitis. There are a few characteristic changes that occur in hepatogenous hypoglycemia that help to differentiate it from the other types. The glucose tolerance test in hepatogenous hypoglycemia gives a characteristic curve in which the fasting sugar is essentially normal; then the curve follows a hyperglycemic pattern for approximately three or four hours, and attains a hypoglycemia level in four to seven hours. Unlike other forms of hypoglycemia, the treatment of hepatogenous hypoglycemia is a high carbohydrate diet (400 to 500 g per day). If, indeed, this man had hypoglycemia three years prior to admission, it seems likely that this may have been an evidence of liver disease.

The next thing that I prefer to discuss is the course of the patient's illness. In the first place, he was afebrile. He had a rapid pulse and a very small pulse pressure. Still, he did not have aortic stenosis, nor any of the many other conditions that we usually associate with a small pulse pressure. He experienced, mainly, pain in the right upper quadrant.

There was definite evidence of liver damage manifested by his liver function tests. He had a bromsulphalein retention of 62 per cent, and a glucose tolerance test which was certainly consistent with hepatic damage. He did not have a change in his albumin-globulin ratio; the cholesterol and cephalin flocculation were not remarkable, but the prothrombin time, the bromsulphalein test, and the glucose tolerance test cannot be overlooked. This, in association with the collateral circulation and the presence of spider nevi, and with a story of ingestion of vast amounts of alcohol for a period of 20 years, makes me think that it is impossible to get away from cirrhosis as a basic diagnosis and to go on from there.

In conjunction with this opinion, the nonvisualization of the gallbladder is not unusual. In an article which appeared last year, a study was done on patients with liver disease, first using six priodax tablets

and, in cases of nonvisualization, repeating the test with 12 tablets. In patients with cirrhosis, 28 per cent had good visualization, 40 per cent had poor visualization, and 32 per cent had no visualization. In other words, in 72 per cent of the cirrhotics tested, there was poor or no visualization of the gallbladder. The author states that nonvisualization of the gallbladder is more common in cirrhosis than in any other type of hepatic disease. So perhaps we may use this, too, as additional evidence of cirrhosis. However, as far as cirrhosis is concerned, there was apparently no inanition. I think it has been shown over and over again that the nutritional state is not important in the development of the cirrhosis. Indeed, many believe that cirrhosis is more common in patients with a history of a high protein intake than it is associated with inanition and the use of alcohol. I feel, then, that this patient had cirrhosis.

Now, he had been a coal miner for many years. That makes me wonder whether the lesions on his hands may have been due to anthracene, which can produce small keratoses and, indeed, malignant changes. I think it is possible that on that basis he may have had a cancer in one of these lesions, and that the encrusted lesions described may have been keratoses. They also may have been due to a vitamin deficiency state or to scratching in association with jaundice.

It is unusual for pain to be associated with cirrhosis, and certainly pain of the nature described would be most unusual. In addition, there was a weight loss of 15 pounds during the past year, and so we wonder if there could be a malignancy in this case. Well, that brings forth several possibilities. Could he have a hepatoma? Hepatoma occurs six times more commonly in males than in females, and much more commonly in cirrhotic individuals than in others. It is very often associated with perihepatitis, which in 60 per cent of the patients gives rise to severe pain. I might mention, too, that cirrhosis is present in 87 per cent of all patients with hepatomas and in only 37 per cent of all those with cholangiomas, making an over-all presence of cirrhosis in patients with primary carcinoma of the liver of 49 per cent. However, McNamara,[2] in studying cases of cirrhosis, found that 11.6 per cent of all patients with cirrhosis developed primary carcinoma of the liver, which I thought was rather high. In hepatoma, with its associated perihepatitis, fixation of the liver often occurs, so that tumor growth would extend upward. Thus, the diaphragm is pushed up and changes are present in the chest film. Unfortunately, there is no elevation of the right diaphragm in this case, which is a disturbing factor. Also, in hepatoma 66 per cent of the patients have ascites. This man had none. However, the disease is often of relatively short duration, and the man would have a large liver. I believe he would have had a preceding cirrhosis.

Well, could there be a cancer some place else? How about a carcinoma of the bile ducts? This occurs primarily at the junction of hepatic, cystic, and common ducts, and more commonly in males. There is weight

loss, chills, and fever in a large percentage of these patients. Pain is present in 66 per cent.

Carcinoma of the gallbladder has an 80 per cent incidence in females and a tremendous incidence of associated stones, which this man apparently did not have. There is almost always a history of repeated attacks of biliary colic. However, in carcinoma of the gallbladder it is striking that one rarely finds anemia. Pain, weakness, and weight loss are the presenting complaints.

Could this man have an islet cell carcinoma of the pancreas with carcinomatosis of the liver? The type of tolerance curve that he shows is not the one usually found. The difficulty that I encounter with this diagnosis—as with the diagnosis of cancer in the bile ducts, the gallbladder, or the lungs, with secondary carcinomatosis of the liver—is that to make it I must discount cirrhosis and make it a separate diagnosis. I prefer to hitch the whole thing together.

There is one condition that I have not considered at all, and that is hemochromatosis, in which we find cirrhosis, diabetes, and portal hypertension. This patient did not show splenomegaly, bronzing of the skin, testicular atrophy, or cardiac enlargement and failure.

It must be considered, too, that this man had pulmonary involvement, liver involvement, and renal involvement. What do we think of with polysystemic disease? We think of periarteritis nodosa. However, I cannot, by any stretch of the imagination, in this instance, make out a case for it. We think also of the granulomas which, of course, produce polysystemic involvement; but to diagnose this I would have to make more than one diagnosis. As far as the other things that could give him right upper quadrant pain are concerned, we would think of cholecystitis, cholelithiasis, liver abscess, and toxic hepatitis. These, too, we believe, would not explain the story as we would like it explained

The patient, after having been hospitalized for a period of time, suddenly develops vasomotor collapse. He has a blood urea nitrogen of 78 mg per 100 ml and a normal urine. It is clear to me, at least, that this is, or should be, a hepatorenal syndrome. In the hepatorenal syndrome, there is vasomotor collapse and high nitrogen retention, with involvement of the renal tubules. There is normal creatinine clearance and a markedly elevated blood nonprotein nitrogen and urea nitrogen with a normal creatinine[3]—normal because creatinine excretion is a function of the glomeruli. Why the marked vasomotor collapse in hepatorenal syndrome? There are many theories about this. There is an excellent article by Thompson and coauthors[4] written in 1940, which explains that the vasomotor collapse is due to the vast amount of liver damage and the resultant inability of the liver to detoxify the depressor substances which are constantly being produced. There are some people who feel that pre-existing renal disease favors the production of hepatorenal syndrome, and, if such is the case, one might point to the Bright's

disease that this patient had at 13 years of age as being of some significance. I don't think so.

This man did not have a plain hepatic coma. He did not have the fever, spasticity, neurologic changes, the cholemic shrieking or flutter.

My diagnosis is anthrocosis or silicosis, bronchiectasis, emphysema, cirrhosis of the liver, hepatoma, and death due to hepatorenal syndrome.

Doctor Foley:* Bronchoscopic examination was made on the sixth day of hospitalization. The bronchial mucosa was diffusely thickened, but it was pale. There was no marked amount of sputum in either bronchus. The carina and all the bronchial spurs were thickened. No other abnormality of the mucosa, ulceration, tumefaction, or acute inflammation of any sort was seen. There was no apparent displacement of the bronchi on bronchoscopy. This was confirmed by the bronchographic findings. The right middle lobe orifice appeared normal, which I would expect. There was no stenosis noted at any point in the tracheobronchial tree. Papanicolaou smears taken at the time this was done were reported as negative.

I agree with the radiologist's findings that there is some bronchiectasis of the right middle lobe. It certainly is not far advanced, and I would doubt that this contributed in any way to the patient's death. I agree with the radiologist that the hilar markings evident on the plain posteroanterior film are of sufficient degree to be inconsistent with a pneumoconiosis alone. The possibility of pulmonary tumor, of course, can't be definitely ruled out. Bronchogenic tumors are notorious for being occult at their primary site and for sending a patient to the hospital with evidence of diffuse metastatic disease. It is relatively common to find a patient evidently suffering from brain tumor, and at autopsy to find a bronchogenic carcinoma. There is nothing in the roentgenograms of this patient to suggest even slightly a primary pulmonary tumor. In the face of the negative cytologic findings, I feel that pulmonary disease in this case, except for emphysema, can be ruled out. The left diaphragm appears to be slightly elevated, possibly due to some congenital weakness of the diaphragm or distention of the stomach. Apparently the slight elevation is not due to phrenic paralysis.

Doctor Kenoyer:** Doctor Hoffman was the ward physician in this case. Will you relate your impressions while he was on the ward?

Doctor Hoffman:*** At first we thought the man had a Laennec's cirrhosis, but we were concerned by the right upper quadrant tenderness. Eventually we thought he had a tumor and cirrhosis, but we were unsuccessful in finding its origin. I should mention that the blood urea nitrogen of 78 mg per 100 ml was done on the day of death. We don't know what it was before.

*Maj. Francis E. Foley, USAF (MC), Chief, Surgical Service.
**Maj. Wilbur L. Kenoyer, USAF (MC), Medical Service.
***First Lt. William A. Hoffman, USAF (MC), Medical Service.

Clinical diagnoses:

1. Laennec's cirrhosis
2. Carcinomatosis, origin?

Dr. Abram's diagnoses:

1. Emphysema and anthracosis or silicosis
2. Bronchiectasis
3. Cirrhosis of the liver
4. Hepatoma
5. Hepatorenal syndrome

PATHOLOGIC FINDINGS

Doctor Kilgore:* At autopsy the main lesion noted was a white, firm mass measuring approximately 3.5 cm and located in the inferior medial portion of the posterior apical section of the left upper lobe. The main bronchus in this area showed slight elevation of the mucosa, but no definite mass was noted.

Outside of the definite border lines of this mass involving the bronchus, the tumor was seen extending in small clumps for several centimeters. Also, in many areas, small lymphatics and blood vessels were filled with clumps of tumor cells. Small areas of tumor were present in the alveolar spaces away from the main lesion.

Except for the presence of pink frothy fluid, the remainder of the bronchi showed no significant abnormality. There was generalized hilar and para-esophageal lymphadenopathy. Particularly noteworthy was a large, white firm lymph node measuring 4.1 cm in its greatest diameter, which was located to the left of the carina and which slightly compressed the left main stem bronchus. These enlarged nodes were replaced by white, firm tissue. Together the lungs weighed 1,940 grams, and showed a considerable amount of pulmonary edema and chronic passive congestion. The liver was probably the most prominent feature (fig. 3). It weighed 5,160 grams. The liver parenchyma was diffusely replaced by white, fairly discrete nodules, varying in size from 0.4 to 2 cm in diameter and showing some hemorrhage and necrosis. There was also a small amount of fine, gray scarring in the liver, but it did not look typical of Laennec's cirrhosis. The spleen weighed 600 grams, and the brain weighed 1,600 grams. The kidneys weighed 280 grams each. There were no metastatic lesions evident in these organs.

On microscopic examination, bronchogenic carcinoma of the anaplastic type was observed to be present. The neoplastic cells resembled lymphocytes with small round dark nuclei, scanty stroma, and a loose arrangement with no definite architectural pattern. In the area where the bronchial mucosa was elevated, the carcinoma had completely replaced it. As sections were taken distally, only the superficial portion of the bronchial mucosa was involved. No definite pattern suggestive of an adenocarcinoma was present. Necrosis and hemorrhage were moder-

*Capt. Donald G. Kilgore, USAF (MC), Chief, Pathology Service.

ately frequent in the lung masses and also in the hilar lymph nodes. In the portions of the lung that were relatively free of tumor, chronic passive congestion and edema were quite prominent. The liver showed a massive replacement by carcinoma and considerable hemorrhage, necrosis, and fibrosis. This fibrosis, however, did not seem typical of cirrhosis, but appeared to be a part of the neoplastic stroma. Microscopic metastases were present in the spleen and also in the lumbar vertebrae. There was no evidence of metastases in the brain, kidneys, or adrenals.

Figure 3. Gross appearance of the liver.

Doctor Abrams: What was the appearance of the kidney tubules?

Doctor Kilgore: They were remarkably well preserved, I should say. There was a slight infiltration of the stroma with lymphocytes and a few neutrophils, such as is seen in early pyelonephritis.

Doctor Abrams: Was there tubular necrosis?

Doctor Kilgore: No, the kidneys were remarkably well preserved. I don't believe the weight of the kidneys in this case was excessive because the patient was a large man. Neither was the brain weight of 1,600 grams excessive.

Doctor Abrams: What do you think, then, was the cause of the sudden vasomotor collapse?

Doctor Kilgore: Possibly acute pulmonary edema.

Doctor Abrams: There was acute pulmonary edema of the lungs?

Doctor Kilgore: Both lungs weighed 1,940 grams, which is approximately four times the normal weight.

Doctor Abrams: How much norepinephrine did you give?

Doctor Hoffman: One ampule per liter of intravenous fluid.

Doctor Abrams: But he did not have pulmonary edema when he first went into shock?

Doctor Hoffman: We thought of that, but it was not evident on examination. Also, blood cultures were negative.

Doctor Kilgore: I might mention that there were adhesions between the liver and diaphragm.

Doctor Abrams: How about the adrenals?

Doctor Kilgore: There was no abnormality of the adrenals.

Doctor Foley: Is it possible that the tumor may have arisen in a peripheral small bronchus?

Doctor Kilgore: The carcinoma arose in a segmental bronchus about 1 cm beyond the bifurcation of the left main bronchus and spread peripherally about 2.5 cm. It would be difficult to visualize, first because of its position in the left upper lobe and secondly because of the sessile nature of the carcinoma. Although the bronchial mucosa was totally replaced by carcinoma in the proximal portion, only the superficial part of the mucosa was involved in the distal portion. This would be against a peripheral origin of the carcinoma with a medial spread along the bronchus. Also, most anaplastic carcinomas originate in the larger bronchi.

Doctor Kenoyer: Dr. Foley, do we have a bronchoscope with a right angle lens?

Doctor Foley: As we routinely do in looking for occult tumors, we examined the patient with Broyles lens bronchoscopes, and the tumor was not visible.

Anatomic diagnoses:

1. Emphysema
2. Bronchogenic carcinoma with metastasis to mediastinal nodes, liver, spleen, and lumbar vertebrae

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Fatal Interstitial Cardiopneumonitis in an Infant

CHESTER M. TROSSMAN, *Lieutenant (MC) USN*
CHARLES N. CURTIS, *Lieutenant Commander (MC) USNR*

DURING the past 15 years interest in interstitial pneumonitis[1,2] and carditis[3-11] has increased. Reports refer to pediatric patients suffering concurrently from these entities.[12,13] While about 10 cases have been reported, only the two patients reported by Tedeschi and Stevenson[14] showed the overwhelming involvement of the heart and lungs found in our patient.

CASE REPORT

An 11-month-old white boy was admitted to the emergency room of the infirmary of this station at 1700 hours on 24 July 1953. The chief complaints were coughing, restlessness, and fainting spells. The present illness began 11 days prior to this admission when the patient developed coryza. A local physician had made a diagnosis of pharyngitis and prescribed "some white tablets." He was on this oral medication for two days and seemed to improve. Four days later he became fussy and refused food. He remained petulant and anorexic until the day prior to admission when he "felt warm to the touch" and regurgitated his milk twice. The night before admission he developed a slight cough. The next morning he awoke with a peculiar facies and a dull, vacant look in his eyes. At intervals he would "faint off." His parents were not quite sure when he returned to consciousness from these fainting spells because he remained so quiet. At noontime his parents noted that his skin and lips were turning blue and that he was sighing a great deal. He was then brought to the infirmary.

The infant had been born vaginally by breech presentation after a full-term gestation. The mother suffered with a toxemia of pregnancy and was hospitalized five days prior to delivery. The infant did not eat well, and remained in the nursery 10 days. As far as the parents knew he was not given oxygen. He was formula-fed but continued to be a poor eater. He had received a series of inoculations for diphtheria, pertussis, and tetanus, but had not been vaccinated. His best weight was 23 pounds.

At the time the infant was three months old, the father was stationed in Guantanamo Bay, Cuba. The infant became ill and a local physician

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diagnosed his illness as a "touch of diphtheria." No throat cultures were made, nor was any antitoxin given. He was treated with parenteral penicillin and streptomycin sulfate for four days. He recovered slowly from his illness in a period of a month and began to gain weight.

One month after his recovery, the family returned to the United States, whereupon the infant developed coryza and pharyngitis. Two weeks later, at the age of five months, he suffered from gastroenteritis followed by otitis media. Subsequently he had several episodes of coryza, and the parents noted that he breathed heavily at times. There were certain unavoidable omissions and discrepancies in the history. We were unable to tell whether the parents were withholding information, had poor memories, or were simply upset.

On admission the general appearance of the infant was alarming. He was comatose, pale, and covered with beads of perspiration. Breathing was labored and characterized by expiratory grunts and deep sighing. Continuous administration of oxygen was necessary to prevent lapse into coma.

The patient exhibited extreme dyspnea, tachypnea (100-120/min), and tachycardia (too rapid to be counted clinically). Rectal temperature was 100.8°F. Vital signs observed throughout the subsequent course of the illness are summarized in table 1.

TABLE 1. *Summary of vital signs recorded during observation of patient from admission to death*

Time (hours)	Pulse (per min)	Respiration (per min)	Rectal temperature
24 July 1953			
1700	Not obtainable	100-120	100.8°F
1940	Not obtainable	96	100.9°F
2030	148 (s)*		
2100	160 (s)		
2130	164	92	
2210	160	90 (comatose)	
2230	164	96	
2300	168	88 (awake)	102.0°F
2330	Not obtainable	92 (restless)	
25 July 1953			
0005	0.2 ml of ouabain and 10 ml of 50 percent dextrose given intravenously		
0030	Respiration ceased; adrenalin injected into the heart		

*(s) = stethoscope

Nothing remarkable was found on examination of the head and neck, but coarse rales were heard throughout the chest. The heart tones were weak, without audible murmurs. The abdomen was slightly distended. An ecchymotic area about two centimeters in diameter was seen on the right calf. Some doubtful nuchal rigidity was observed. No other findings of consequence were noted at this time. The admission diagnosis was acute bronchiolitis and shock. Roentgenograms of the chest were unsatisfactory due to the infant's rapid and labored breathing. A complete blood count showed: red blood cells, 3.21 million/μl; white blood cells, 16,800/μl, with a differential of 58 per cent neutrophils, 37 per cent lymphocytes, and 5 per cent nonsegmented neutrophils. Hemoglobin was 8.5 g per 100 ml.

The infant was placed in an air-conditioned oxygen tent to which had been attached an automatic Miller aerosol device[15] for the administration of Alevaire (brand of a detergent superinone) mist He was given an initial dose of 60 mg (100,000 units) of plain penicillin and 500 mg of streptomycin sulfate. This was to be followed by 30 mg (50,000 units) of penicillin and 125 mg of streptomycin intramuscularly every six hours. He seemed more comfortable in the tent and voided copiously soon after being placed in it.

At 2100 hours, four hours after admission, we were called to see the infant because of his lack of response to treatment (oxygen, Alevaire mist, penicillin, and streptomycin). His general appearance was the same as it had been on admission prior to administration of oxygen except that he was conscious. He appeared alternately restless and very quiet. A complete examination revealed the following significant findings. The chest was dull to percussion at both bases. Auscultation of the chest revealed moist rales anteriorly and tubular breathing throughout all lung fields. The left border of the heart was percussed in the anterior axillary line. No cardiac thrill was present. The heart tones were obliterated by the noisy, rapid respirations. The liver edge was palpated three fingerbreadths below the right costal cage. The feet were not edematous. Other findings were the same as noted on the original examination. Our clinical diagnosis at this time was (1) overwhelming pneumonitis, and (2) impending heart failure with dilation of the heart due to the morbid effect of the pneumonia.

The infant was given 0.5 cat unit of ouabain intravenously. (Ouabain was not our first choice, but was the only cardiotonic for intravenous administration available.) Following this, 50 per cent dextrose was administered intravenously in a heroic effort to stimulate the failing heart. When 10 ml had been given, respiration and heart beat ceased. Adrenalin was injected into the heart without effect. The infant was pronounced dead 7 hours and 35 minutes after admission.

We used the hypertonic dextrose[16–21] as an emergency measure on a moribund patient. Older texts recommend it in the treatment of patients with toxic myocarditis accompanying infections such as diphtheria,

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scarlet fever, or poliomyelitis. Most modern authorities are opposed to such use. They believe that hypertonic dextrose administered intravenously merely causes further heart strain by increasing the circulating blood volume.

Post-mortem Examination

Gross findings. Due to limited facilities the examination was restricted to the chest and abdominal cavities. The 11-month-old white male infant weighed 22.5 pounds. Post-mortem lividity was present and rigor mortis was marked. An area of ecchymosis about two centimeters in diameter was noted on the right calf. An average amount of subcutaneous fat was present. There was no evidence of dehydration. Many petechiae were present on the pleura, which was glistening, smooth, and free from adhesions. About two ounces of clear, straw-colored fluid were present in each pleural cavity. The lungs were partly collapsed and resembled anthrocotic adult lungs. Small, whitish, depressed areas were present on the external surface of the lung. The lung tissue was quite firm and noncrepitant. Clear serosanguineous fluid oozed from the cut surface of the lungs. No exudate appeared at the cut surface of the bronchi or large bronchioles. Both lungs presented a similar gross appearance. The pericardium and pericardial sac had been pierced by the adrenalin needle but were otherwise normal. A few milliliters of fluid were present in the pericardial sac, similar to that found in the pleural spaces. The great vessels were normal. The heart was pale pink, enlarged, and flabby. No congenital anomaly or valvular involvement was present. All chambers of the heart seemed equally enlarged. The enlargement was due both to a thickening of the endocardium and to an increase in size of the chambers. Drained of blood, the heart weighed 112 grams. (Normal weight for the heart of an infant of this size is about 45 grams.) A serosanguineous material oozed from the cut surface of the heart. There was no gross evidence of neoplasm or of granulomatous tissue. The remaining chest contents seemed normal.

In the abdomen more peritoneal fluid was present than usual. The fluid was clear, yellow, and odorless. No adhesions were found. The liver was markedly enlarged. Fluid oozed from the cut surface. The gastro-intestinal tract seemed normal externally and was not removed. The kidneys were slightly edematous, but the cut section appeared normal except for edema fluid that oozed from the surface. Unfortunately, the adrenal glands were not studied.

At the beginning of the post-mortem examination, fluid from the pleural and subarachnoid spaces was obtained aseptically and cultured. No growth was observed in 48 hours.

Microscopic findings. Heart: Sections of heart showed an epicardium containing almost no fat; scattered, dilated vascular spaces were seen. In the underlying myocardium, the muscle fibers revealed intact striations throughout and centrally placed nuclei, which were in all in-

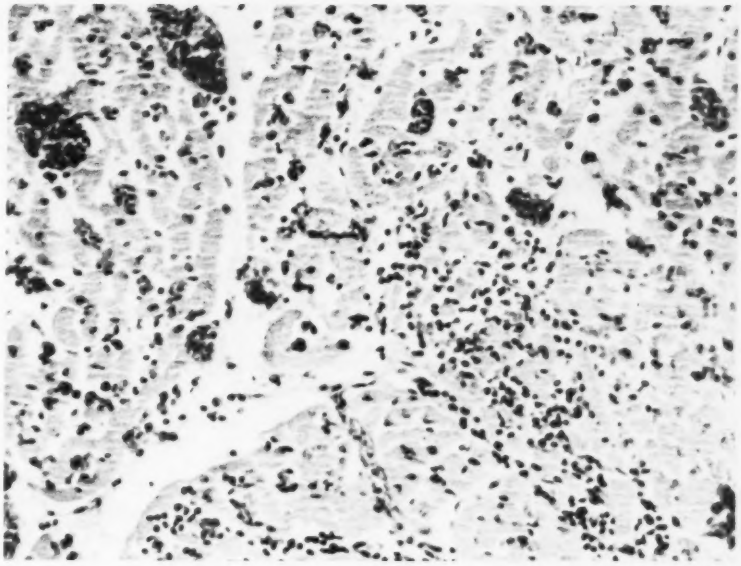

Figure 1. Photomicrograph showing cardiac muscle fibers surrounded by edema fluid containing many round cells. (Hematoxylin-eosin stain, × 100)

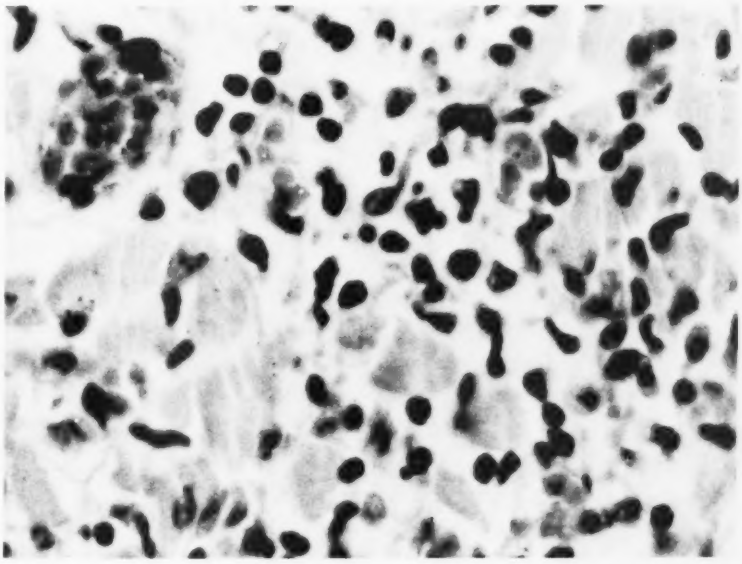

Figure 2. Section of heart showing intact muscle fibers, congested capillaries, and round cell infiltration of edema fluid between muscle fibers. (Hematoxylin-eosin stain, × 400)

stances well preserved. The fibers were markedly separated, presumably by edema and by severely engorged capillary spaces. There was a focal and diffuse inflammatory infiltrate throughout the myocardium by cells that appeared to be chiefly lymphocytes with scattered macrophages and rare plasma cells. The endocardial surfaces in the sections studied were free of any thrombus or vegetation, and were composed of a single layer of flattened cells.

Lungs: Sections of lung showed the bronchi to be lined by orderly cuboidal epithelium, to contain no exudate, and to be free of inflammatory change. The alveoli were uniform in size and contained large amounts of precipitated, pink-staining debris encompassing a few desquamated cells and scattered groups of macrophages. The alveolar walls appeared to be thickened, and in some areas alveolar spaces were markedly narrowed. The capillaries were congested, and there was a diffuse cellular infiltrate that appeared to be present in the alveolar walls and to be composed chiefly of lymphocytes and scattered plasma cells and macrophages.

Liver: Sections of liver showed the architecture to be well preserved with rather marked prominence of capillaries and evidence of edema. No evidence of significant inflammatory infiltration was observed. Focally, just beneath the liver capsule, the cells were frequently vacuolated, which presumably represented fatty metamorphosis.

Kidneys: Sections of the kidneys showed good preservation of architecture with congestion of capillaries in the pyramids and no significant inflammatory infiltrate.

The diagnosis of Dr. George Meissner, based on examination of histologic sections (figs. 1-4), was interstitial pneumonitis and interstitial carditis. The histologic findings appear to be those of a nonspecific inflammatory process involving the lung and the heart, with no indication as to order of involvement. The cause, histologically speaking, is not apparent, although the type of cellular infiltrate was one that is commonly associated with virus infections without secondary bacterial involvement.

DISCUSSION

The bizarre clinical course and unusual pathologic findings in this patient profoundly impressed us. We found nothing quite like it in the standard texts or literature except two cases reported by Tedeschi and Stevenson (table 2). While all the pathologic changes were in progress, the parents were hardly aware until the day of the infant's death that anything but a mild illness was present. The patient had a very slight fever, and there were few external signs or symptoms of what was taking place internally. His poor health dating from birth is of interest. What ailment did he really have in Cuba? Probably not diphtheria, considering that he presumably had had diphtheria immunization, and that he re-

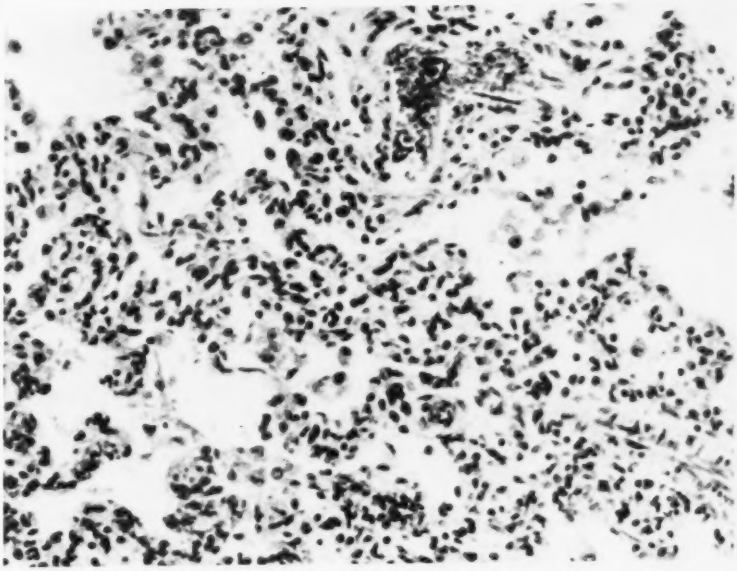

Figure 3. Photomicrograph of section of lung showing narrowed alveolar spaces filled with amorphous, cell-free, pink-staining debris; patent bronchioles free from exudate; and congested capillaries. (Hematoxylin-eosin stain, × 100)

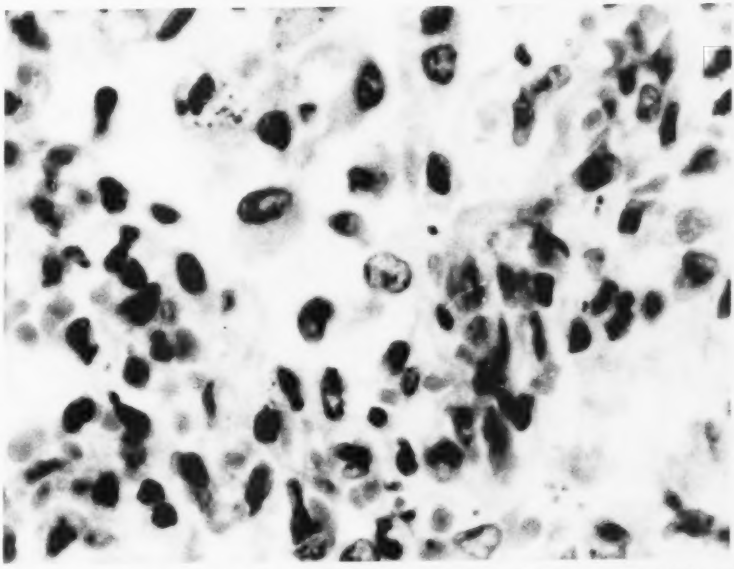

Figure 4. Photomicrograph of section of lung showing alveolar walls thickened by cellular infiltration. (× 400)

TABLE 2. *Similarities between our case and cases reported by Tedeschi and Stevenson*[14]

Criteria	Trossman and Curtis*	Tedeschi and Stevenson	
	Case 1	Case 1	Case 2
Age	11 months	11 months	6 weeks
Duration of illness before admission	11 days	1 day	4 days
Duration after admission	7.5 hours	2 hours	8 hours
Mild afebrile illness prior to admission	URI**	URI**	Gastroenteritis
Severe tachycardia, dyspnea, and cyanosis on admission	Yes	Yes	No cyanosis
Clinical or roentgenographic evidence of large heart	Both	No (yes at autopsy)	Yes
Evidence of enlarged liver	Clinical	No (yes at autopsy)	No (yes at autopsy)
No response to antibiotics or oxygen	Yes	Yes	Yes
Leukocytosis without shift to left	Yes	Not done	Yes
Sterile bacteriologic cultures at autopsy	Spinal and pleural fluid	Heart and lungs	Heart, lungs, and spleen
Interstitial cardiopneumonitis on histologic section	Yes	Yes	Yes

*Reported herein
**URI = upper respiratory tract infection

covered from the illness in Cuba without the use of antitoxin. Could the widespread pathologic changes seen at post-mortem examination develop within a mere 11 days? What was the first site of disease: heart or lungs? The work of Saphir and Amromin[12] suggest the latter.

How could an earlier diagnosis have been made? Perhaps only by someone with a sixth sense who would do a complete examination, including roentgenograms and an electrocardiogram, on an infant with a febrile upper respiratory tract infection who did not "look right."

The most important problem concerns the causative agent. Bacteria, viruses, vitamin deficiencies, and protozoa have all been implicated in this type of disease,[5] but none of these have been proved in a consistent number of cases. Adams[1] suggested that in a debilitated infant a respiratory virus, which would ordinarily be localized in the upper respiratory passages, may invade the alveoli to cause a low-grade inflammatory reaction in the interstitial interalveolar spaces without much systemic reaction until the process is far advanced. If the causative agent was such a respiratory virus, it surely must have been blood-borne at a certain stage of the infection to cause the widespread cardiac involvement seen.

SUMMARY

A fatal case of interstitial cardiopneumonitis in an 11-month-old infant is reported. From the clinical standpoint, the infant suffered only a mild illness during the 11 days preceding his death. This case is virtually identical with two reported by Tedeschi and Stevenson. Earlier diagnosis of these cases would be an aid to critical studies of the cause of this entity. Due to the lack of clinical signs and the insidious nature of this ailment, early diagnosis can only be made by: (1) ordering roentgenographic examination of the chest in all sick children, especially those under two years of age, whose illnesses are undiagnosed after seven days; and (2) following up with electrocardiograms those patients showing either pneumonitis or an enlarged heart. The possible etiologic mechanisms of this disease are discussed.

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HOME VS. HOSPITAL DELIVERIES

Deliveries in hospitals have now become almost the universal rule. This is so, not because it is imposed by the doctor for his convenience as is often charged, but rather because it is in the interest of the mother and her baby. Home deliveries cannot compete with the maternity hospitals in efficiency and safety. Furthermore, home deliveries, if conducted in the most approved manner, require the services of three trained nurses on an eight hour shift. Trained nurses are difficult to find for private duty, and their services are expensive. Above all else, the hospital affords the maximum of security in event of unexpected complications. The safety of the mother and the baby is the prime consideration, and there can be no question as to the choice between the home and the hospital.

—PALMER FINDLEY
in *Nebraska State Medical Journal*
p. 531, Dec. 1954

Pulmonary Adenomatosis: Needle Biopsy Diagnosis

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PULMONARY adenomatosis remains a rarity despite the increasing number of cases reported in the last 5 years (a total of 232 at this writing).[1] This disease is characterized by progressive filling of the alveoli by columnar epithelial mucus-producing cells. To date 36 different names for this condition have been proposed. This semantic chaos is traceable in part to the continuing argument as to whether the abnormal cells filling the alveoli arise from the epithelium of the terminal bronchioles,[1-3] or by metaplasia of the alveolar lining cells.[4-7] Recent work shows an increasing trend toward acceptance of terminal bronchiolar cell origin.

Many theories concerning the cause of the disease have been advanced,[1,4] but the one that it is due to virus seems to be the most intriguing because of the clinical and histologic similarity between pulmonary adenomatosis and the disease, *jaagsiekte*, of sheep, which is considered to be caused by virus. Because pulmonary adenomatosis is incontrovertibly a neoplastic process, acceptance of the theory of its virus origin requires the supposition that a cell-specific carcinogenic virus attacks either the terminal bronchiolar epithelium or the alveolar lining cells. It is perhaps more likely that genesis of the neoplasm depends on a combination of cell-specific virus,[8] plus hereditary susceptibility, plus the action of irritants, either bacterial[9] or chemical.[10] The striking similarity between *jaagsiekte* and pulmonary adenomatosis may hold the key to the etiology not only of pulmonary adenomatosis but possibly other lung tumors as well. Thus far, only a limited amount of research has been reported in this field.[8,9]

According to Good and associates,[11] pulmonary adenomatosis can be graded roughly into two categories: (1) the relatively benign—those neoplasms which have a long course (usually over 3 years), spread very slowly, are essentially benign by the usual histologic criteria, and fail to invade or metastasize; and (2) the

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definitely malignant—those neoplasms which have a short course (usually less than 2 years), grow rapidly, invade locally, and metastasize widely. Some authors prefer to call the "benign" cases pulmonary adenomatosis, and refer to the "malignant" cases as alveolar cell tumor.[12, 13]

The purpose of this article is to present an unusual case in which ante-mortem diagnosis was confirmed by needle biopsy of the lung.

CASE REPORT

A 61-year-old housewife was admitted to the hospital in September 1953 with a history of persistent cough and increasingly severe dyspnea since 1947.

At the onset of her illness the patient had had frequent "colds" associated with the expectoration of considerable amounts of frothy clear sputum, much like soapsuds in appearance. This characteristic sputum persisted throughout her illness. A chest roentgenogram taken in 1948 showed an irregular density in each lung (fig. 1). Penicillin was given for a supposed pneumonitis. No follow-up films were taken. The productive cough continued, but the patient was otherwise well until a bout of abdominal pain resulted in the removal of a fibrocystoma of the right ovary in 1948.

In March 1950 an intercurrent pneumonia developed, which cleared with a 7 weeks' course of penicillin and aureomycin. Productive cough remained. By 1951 mild dyspnea on exertion had developed, but was unassociated with orthopnea or ankle edema.

Because of increasing dyspnea, the patient was admitted to an army hospital in May 1952. A chest roentgenogram (fig. 2) demonstrated a homogeneous density involving the lower two thirds of the left lung field; the right hilar mass noted in 1948 appeared larger, with herniation of the inferior portion of the right lung into the left hemithorax. Two bronchoscopic examinations were negative for endobronchial tumor. Bronchial washings were negative for *Mycobacterium tuberculosis* (smear and culture), fungi, and malignant cells. A complete blood count, urinalysis, and erythrocyte sedimentation rate were normal. Skin tests for tuberculosis, histoplasmosis, and coccidioidomycosis were negative. The patient was discharged unimproved and readmitted 1 month later. Repeat studies, including bronchoscopy with culture of the washings, shed no further light on the problem. She was discharged with a diagnosis of possible chronic lipoid pneumonia.

In September 1953 the patient was admitted to this hospital because her dyspnea had become incapacitating. She denied ever having had orthopnea, ankle edema, or chest pain. She had lost 40 pounds since 1947. Physical examination revealed a thin, chronically ill woman who was dyspneic, but not cyanotic. There was mild tachycardia and tachyp-

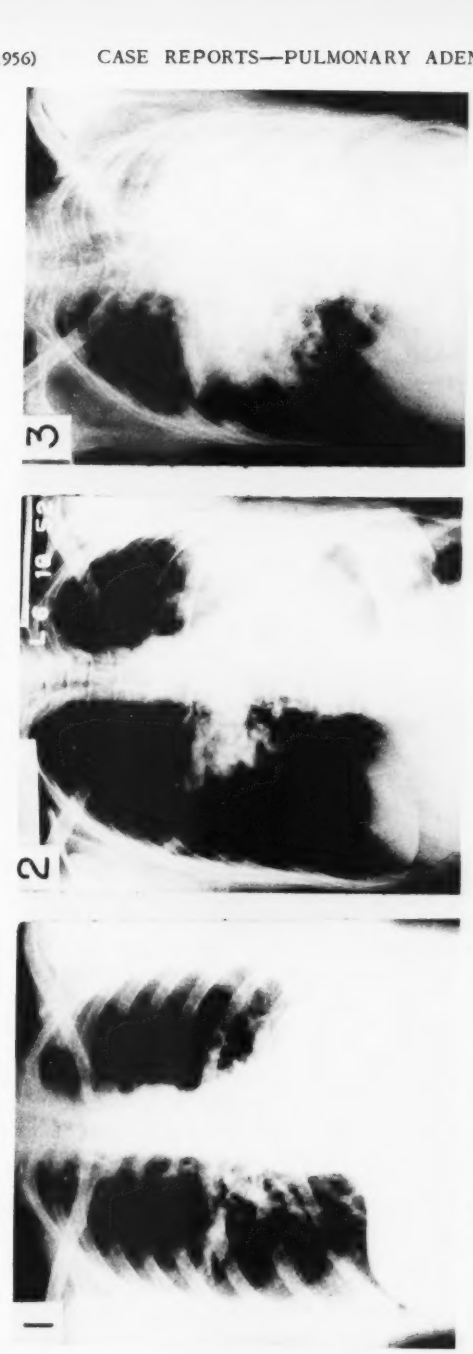

Figure 1. Bilateral pulmonary infiltration is evident in this roentgenogram taken in 1948, about 1 year after the onset of symptoms. Figure 2. Five and one-half years later, the left lung is practically airless, and the right lung shows compensatory emphysema. Extension of the growth to the thoracic wall (on the left) obviated two potential complications of needle biopsy: pneumothorax and seeding of neoplastic cells along the needle track. Figure 3. Roentgenogram taken 15 months later than the one shown in figure 2 and 7 years after the onset of the disease. The patient had severe dyspnea but no pain. She died 2 months later.

nea, but no fever. Significant physical findings included shift of the trachea and heart to the left, flatness to percussion and absence of breath sounds over the lower two thirds of the left side of the chest, and hyperresonance over the right side of the chest. There was no clubbing of the fingers.

Her leukocyte count varied between 10,000 and 15,000 per cu. mm. with a normal differential. Her erythrocyte count was 6.1 million per cu. mm.; her hemoglobin was 15.5 grams per 100 ml.; hematocrit, 48 percent; sedimentation rate, 20 mm. per hr. (Wintrobe); and urinalysis was negative. Sputum examinations for *Myco. tuberculosis* (smear and culture), fungi, and malignant cells were repeatedly negative. *Micrococcus pyogenes* var. *albus* and *Streptococcus viridans* were cultured from the sputum. Skin tests using the tuberculin, histoplasmin, coccidioidin, and echinococcus antigens were negative. Chest roentgenogram showed relentless bilateral progression of the disease (*fig. 3*).

In October an episode of sharp, stabbing pain in the anterior part of the right side of the chest was associated with a friction rub, rales, slight fever, and tachycardia. The presumptive diagnosis was pulmonary infarction. No change could be seen on the chest roentgenogram, and the symptoms and findings cleared within 5 days.

When the sputum studies and skin tests shed no further light on the problem, lung biopsy was considered as the only remaining hope of diagnosis. Using a Vim-Silverman needle, the left lung was biopsied through the ninth interspace in the posterior axillary line. Biopsy was uneventful, and the pathologic report confirmed the diagnosis of pulmonary adenomatosis.

Dyspnea increased in severity, and during the last 3 weeks of life the patient used an oxygen mask intermittently. It was believed that radiation therapy might offer palliation, and arrangements were made for treatment with a 2 million-volt cobalt unit, in order to minimize post-radiation pneumonitis. However, 3 hours following the first treatment, the patient died of respiratory failure.

AUTOPSY

Gross findings. The right pleural cavity contained 700 ml. of fluid, without adhesions. The left pleural cavity was obliterated by fibrous adhesions, and the mediastinal structures were deviated to the left. The right lung weighed 1,000 grams, and sectioning revealed that most of the parenchyma was rendered solid by mucoid tumor tissue. The left lung weighed 500 grams and was similarly infiltrated. The bronchi, although compressed, showed no gross evidence of invasion by the tumor. The hilar nodes were slightly enlarged. The left pulmonary artery was occluded by a partially organized thrombus adherent to the intima. The heart weighed 400 grams and appeared slightly enlarged, particularly on the right, with the right ventricular wall measuring 6 mm. in thickness.

Microscopic findings. Sections from the lungs showed a consistent and almost monotonously uniform histologic picture throughout. The alveoli were lined with tumor cells, which were tall columnar epithelial in type, in single layers forming glandlike structures (fig. 4). The nuclei were large, irregular, hyperchromatic, and basally located. An acid-

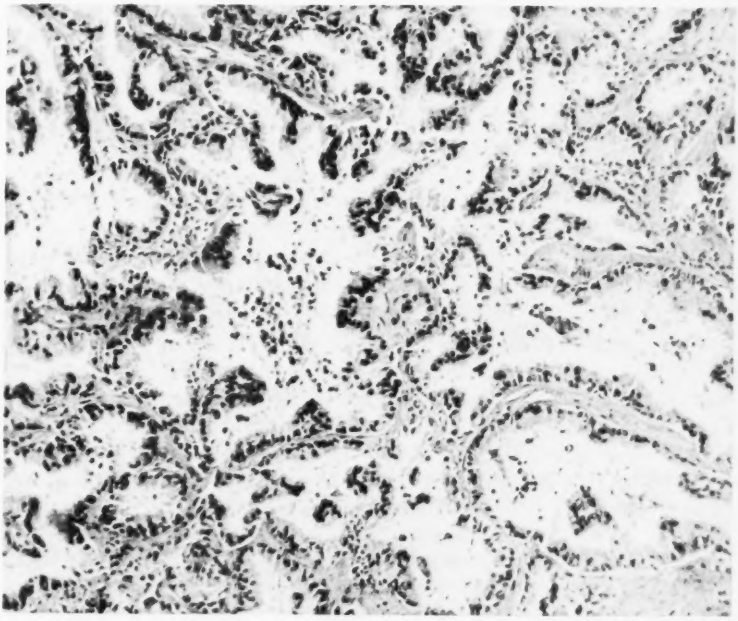

Figure 4. Characteristic histologic illustration of pulmonary adenomatosis: columnar mucus-forming cells lining the alveoli without altering the lung architecture. (× 100)

ophilic coagulum was found within the lumen of the alveoli. In certain areas the tumor cells formed papillary projections into the lumen of the alveoli. Specimens of the lung were sent to the Armed Forces Institute of Pathology, where the diagnosis was confirmed. Their examination demonstrated invasion of a bronchus as well as regional lymph node metastases. Examination of the brain and spinal cord was not done, but complete examination of the rest of the body did not reveal the presence of any other neoplasm, either primary or metastatic.

DISCUSSION

The one characteristic sign of pulmonary adenomatosis, which this patient demonstrated so well, was the prolonged copious production of frothy mucoid sputum, often described as having a soapsuds appearance. On the other hand, several unusual features of this case are worthy of comment. The duration of life of most

patients with pulmonary adenomatosis is several months, with only 8 percent having a history longer than 2 years. Dennis and associates[4] reported a case in which roentgenographic findings were present 2 years before death. In their review of the literature they had not found a report of longer duration. Our patient had definite roentgenographic changes 6 years prior to death, coincident with the onset of cough and expectoration. The extremely slow progression of symptoms and roentgenographic changes was in keeping with the autopsy findings of minimal bronchial invasion and metastases limited to the regional lymph nodes. The "malignancy" of the pulmonary adenomatosis in this patient was of a relatively low order.

Chest pain is one of the most common symptoms[1,14] in pulmonary adenomatosis. Our patient was free of chest pain except for that caused by the brief pulmonary infarction episode. It is a known fact that cyanosis and clubbing of the fingers are common accompaniments of any process causing progressive anoxia, but neither of these manifestations was present in this patient. The probable reason was the extremely gradual progression of the anoxia.

Needle biopsy of the lung is not new in the diagnosis of pulmonary adenomatosis.[14,15] The diagnostic value of this procedure is emphasized in this case and its more frequent use is encouraged. Such biopsy is relatively innocuous, particularly when the tumor extends to the lung periphery. Five-year survivals have been reported[14] following surgical resection in patients with unilateral pulmonary adenomatosis. Therefore it is of paramount importance that every available means be used to arrive at a diagnosis.

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STATISTICAL MAN

"Statistical man, by definition, is about average in every respect; real men are likely to deviate markedly from the average in many respects. If it were possible to produce a synthetic statistical man, there is no telling what he would be like. Undoubtedly he would be extraordinary; possibly he would lack susceptibility to disease. Real individuals, on the other hand, have peculiarities in metabolism as well as disease susceptibilities, and it seems reasonable to suppose, as a working hypothesis, that the peculiarities and the susceptibilities are closely related. It also seems reasonable to hope, on the basis of the genetotrophic concept, that many diseases of obscure etiology can be successfully attacked once we are acquainted with their biochemical nature.

"The fact that enzyme levels in the blood are characteristically different for different individuals clearly indicates that the body chemistry of each individual is distinctive. While the total metabolism of each of two men of about average height and weight, measured in calories, may be about the same and very close to that of statistical man, the details of the metabolism of each may be highly distinctive. Some specific chemical reactions may be taking place in one individual ten times as fast as they are in another. If this is true, surely this must be the basis for differences in disease susceptibility."

—ROGER J. WILLIAMS, WILLIAM DUANE BROWN, and ROBERT W. SHIDELER
in *Proceedings of the National Academy of Sciences*
p. 619, Sept. 1955

Hematotympanum at Reduced Barometric Pressure

DOMENIC A. VAVALA, *First Lieutenant, USAF (MSC)*

OCCASIONALLY, incidents occur at reduced barometric pressure either in low pressure altitude chambers or in actual flight which have been either infrequently or never encountered previously, or have never been reported in the literature. Failure to disseminate the facts surrounding these cases certainly does not enhance our knowledge of aviation medicine nor does it increase our competence in caring for our flying personnel. The possibility of the recurrence of these rare incidents should motivate us to fortify ourselves with the information necessary to handle them in a successful manner. The case of hematotympanum reported herein is one of those rare occurrences which is being brought to the attention of aviation physiologists, physiologic training officers, and flight surgeons.

Each individual about to take a simulated flight in the low pressure chamber at this medical facility is required to undergo a preflight physical examination. The purpose of this examination is to uncover any contra-indications which might prohibit the individual from taking the simulated ascent to altitude. The individual's age, height, weight, pulse, body temperature, and blood pressure are recorded on a medical evaluation form. The upper limits for weight, body temperature, and blood pressure are strictly adhered to. The subject is questioned regarding the presence of upper respiratory infections, sinus or allergic conditions, headaches, ear involvements, and diarrhea. He must also state if he has previously experienced any untoward effects at altitude either in actual flight or in a low pressure altitude chamber. He is queried about his drinking habits of the past 24 hours, and the number of hours' sleep on the previous night. If the man has a reason for not wanting to take the chamber flight, he is at liberty to state such. Each completed medical evaluation form is then reviewed by the physiologic training officer in attendance, who either qualifies or disqualifies the subject for the flight. In doubtful or borderline cases the flight surgeon's office is consulted for a final disposition.

From U. S. Air Force Hospital, Ellington Air Force Base, Tex.

CASE REPORT

On 2 March 1955 an aviation cadet, together with 15 other students, was scheduled for a routine type 2 chamber flight at 0800 hours. A type 2 chamber flight involves ascent from ground level to a simulated altitude of 43,000 feet and descent to ground level. The rate of ascent and descent is at 2,000 feet/minute. The preflight physical examination of the man revealed the following physical findings: age, 21 yr; height, 6 ft 2 in.; weight, 185 lb; body temperature, 98.6°F; blood pressure, 136/74 mm Hg. He had never previously experienced any unusual symptoms at altitude, and was free of upper respiratory infections, headaches, and diarrhea. He had received no immunizations within the past 14 days, was not fatigued, had more than 6 hours' sleep the night before, and either had no alcoholic beverages within the past 24 hours or had the alcoholic equivalent of two bottles of beer. The physiologic training officer in attendance qualified him for the chamber flight. The chamber reached the simulated altitude of 43,000 feet, leveled off for about 2 minutes, and then made a free fall to 30,000 feet. The chamber was leveled off at this altitude long enough to ascertain if anyone was having difficulty clearing his ears. Since no one was experiencing any difficulty, the chamber resumed its descent to ground level at the rate of 2,000 feet/minute. At 18,000 feet on descent, the cadet signaled that his ears were blocked. The chamber was immediately leveled to allow him to clear his ears which he accomplished readily and without any difficulty. He experienced no pain at this time, merely a sensation of fullness. The chamber resumed its descent. At 5,000 feet during the descent the inside observer noticed blood oozing from the cadet's left ear. The chamber was leveled and the subject was asked how he felt. His response indicated he felt no pain and was fine. The chamber continued its descent. Upon reaching ground level the subject was immediately dispatched to the flight surgeon's office. Examination revealed that the outer cutaneous layer of the tympanum on the left side had become separated from the rest of the ear drum. There was fresh blood on the ear drum and in the external canal. No pain was present in either ear during the descent or at any time thereafter. The bleeding was stopped and therapy against secondary infection instituted. The left ear drum healed completely without any impairment of hearing.

DISCUSSION

Shortly after this incident occurred, the U. S. Naval and U. S. Air Force Schools of Aviation Medicine were consulted about this case. One of the schools stated it had never seen a case exactly as described in this report.[1] The other institution stated it had encountered such cases in the past, but did not mention the number of cases nor the period of time over which they had occurred.[2]

The possible cause of this lesion, or of similar ones in the future, becomes both challenging and interesting. A pre-existing

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infection, an anatomic predisposing factor, or barotrauma are all possible causes.

A pre-existing infection in and about the ear could cause a dissection of the ear drum such as occurred in the present case. However, most of the previous cases involving dissection of layers of the tympanum at reduced barometric pressures had no previous infection.[2] The man described herein had no apparent pre-existing infection.

If any of the layers of the ear drum are thinner than normal, this would constitute an anatomic predisposing factor.

Bullous myringitis, which might happen to be present, may cause the same type of lesion by the rupture of a bleb formed incident to a reduction in barometric pressure.

Another possible cause, although a less likely one in the present case, would be a subepithelial hemorrhage of the ear drum. This occasionally occurs incident to barotrauma. In this instance the pressure of the accumulating blood might rupture one of the layers of the ear drum. If an anatomic predisposing factor were also present, the rupture might occur more readily.

Traumatic rupture of the tympanum incident to reduced barometric pressure is another possible cause. If any of the layers of the ear drum are thinner than normal, the possibility of rupture incident to reduced barometric pressure would be enhanced. The subject in the present report had no apparent pre-existing infections nor other ear involvements. The most likely cause in this particular instance seems to be traumatic rupture of the tympanum incident to reduced barometric pressure. Since some degree of hemorrhage can be expected to occur, this condition is known as hematotympanum. Traumatic rupture also probably explains the absence of pain following the initial sensation of fullness of the "blocked" ear and at any other time thereafter. If this man's ear drum happened to have a thin outer cutaneous layer, it increased the possibility of rupture.

SUMMARY

A rare case of hematotympanum at reduced barometric pressure under simulated flight conditions is presented. The possible cause in the present instance and in similar ones in the future is discussed. The most likely cause of the case herein reported was believed to be traumatic rupture of the ear drum incident to reduced barometric pressure; in this man the ear drum healed completely without any impairment of hearing.

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A MESSAGE FROM THE A. M. A.

Last month the American Medical Association message covered some of the military medical activities of the Council on National Defense. The Council is also concerned with the medical aspects of civil defense preparedness. In this field it assists in planning for the distribution of medical and allied personnel in an all-out emergency, aids with national and state disaster relief plans, and co-ordinates the work of state emergency medical service committees.

Physicians must be prepared to promptly aid and treat casualties following a natural disaster such as a storm, flood, or fire. They would also be required to manage and care for millions of casualties should this country experience a biological, chemical, A-bomb, or H-bomb attack. The Council helps doctors to prepare themselves for these types of emergency treatment and care.

In addition to educating individual physicians as to their civil defense responsibilities, the Council assists state groups in medical civil defense planning. The Council also collects, prepares, and distributes general and technical information in this field for both military and civilian use. Each year the Council sponsors two Conferences on the medical aspects of civil defense and natural disasters. The Council maintains close and constant liaison with the Federal Civil Defense Administration and frequently assists other established relief agencies and industrial groups in planning disaster relief programs.

Let's turn now to one of the standing committees of the House of Delegates: the Council on Medical Education and Hospitals of the American Medical Association. This Council conducts many activities of significance to premedical students, medical students, practicing physicians, and the public. In co-operation with the Association of American Medical Colleges it surveys all medical schools and maintains and publishes an annual listing of approved medical schools. It collects, classifies, and disseminates information regarding medical schools, hospitals, internships, residencies, technical schools, postgraduate opportunities, and medical licensure. Its efforts are constantly directed toward elevating the standards of medical education in keeping with the dynamic progress in medical knowledge and in the public interest.

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense. —*Editor.*

The Council holds three regularly scheduled meetings annually. It has numerous active committees working in liaison with such organizations as the Association of American Medical Colleges, the Advisory Board for Medical Specialties, and the American Hospital Association in regard to problems of mutual concern. The Council works closely with the Federation of State Medical Boards of the United States, the Joint Commission on Accreditation of Hospitals, the American College of Surgeons, the American College of Physicians, and the various governmental medical services; it collaborates with many other organizations and agencies that have an active concern in one or more phases of medical education. The Council, in co-operation with the Federation of State Boards of Medical Examiners and the Advisory Board for Medical Specialties, is responsible for conducting an annual Congress on Medical Education and Licensure.

As part of its responsibility in the field of medical education, the Council prepares a detailed annual report on Medical Education in the United States and Canada, which appears in one of the fall issues of the *Journal of the American Medical Association*. It also prepares special issues for that journal on Postgraduate Continuation Courses for Physicians (summer), Medical Licensure Statistics (spring), Directory and Annual Report of Approved Internships and Residencies (fall), and a Residency Information Bulletin.

Through its Division of Hospitals and Graduate Education, the Council maintains an active Field Survey Staff which periodically reviews hospitals maintaining approved internships and residencies. Reports of the field staff are reviewed by an Internship Review Committee for consideration of approval of internships and by Residency Review Committees for consideration of approval in each of the specialty areas.

The Council has recently published the report of a three-year study of postgraduate medical education in the United States and is currently engaged in preliminary consideration of its future role and responsibilities to the profession in this area. In addition it is responsible for the preparation of a large number of publications concerning medical education and related subjects, all of which have wide distribution and are available on request.

MILITARY AND CIVILIAN MEDICAL OFFICIALS VISIT CARIBBEAN AREA

Dr. Frank B. Berry, Assistant Secretary of Defense (Health and Medical), accompanied by members of his Civilian Advisory Council, the Surgeons General and Dental Surgeons, as well as other representatives of the Department of Defense, visited military medical installations of the three military departments from 10 until 21 December 1955. The primary purpose of the trip was to discuss local problems with medical and dental personnel stationed at the areas visited.

Some members of Dr. Frank B. Berry's party which visited the Caribbean area in December 1955 are shown here at Guantanamo Bay, Cuba. From left to right: Major General Silas B. Hays, MC, USA, Surgeon General, Department of the Army; Wilburt C. Davison, M. D., Member of the Civilian Health and Medical Advisory Council; Edward H. Cushing, M. D., Deputy Assistant Secretary of Defense (Health and Medical); and B. Noland Carter, M. D., Member of the Civilian Health and Medical Advisory Council.

The itinerary included Kindley Air Force Base, Bermuda; U. S. Naval Hospital, Key West, Fla.; all military facilities in the Panama Canal Zone; U. S. Naval Base, Guantanamo Bay, Cuba; military facilities in San Juan, Puerto Rico; and Ramey Air Force Base, Puerto Rico.

Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received permanent promotions to the rank indicated.

MEDICAL CORPS

ANDERSON, Clarence, Capt., USA
BAKER, Robert W., Capt., USAF
BALYEAT, Ray M., Capt., USAF
BEDNARZ, Wallace W., Capt., USAF
BICKERTON, John H., Jr., Maj., USAF
BOYSEN, Alexander M., Capt., USA
CAMPBELL, Robert P., Lt. Col., USA
CARBONELL, Arthur J., Lt. Col., USA
CHAMBERS, William N., Capt., USAF
COX, Robert S., Jr., Capt., USA
CROSBY, William H., Jr., Lt. Col., USA
CROZIER, Dan, Lt. Col., USA
CURRIE, Howard F., Lt. Col., USAF
DETTINGER, Garth B., Capt., USAF
DIGIOVANNI, Anthony J., Capt., USAF
DRAPER, David H., Capt., USAF
EISNER, David G., Lt. Col., USA
FERRIS, Donald L., Col., USAF
FRED, Ann C., Capt., USA
GEPPERT, Leo J., Lt. Col., USA
GERARD, Earl S., Capt., USA
GOOD, Frederick D., Maj., USAF
GOOD, Hugh D., Capt., USAF
GRISSOM, Paul M., Capt., USAF
HANNA, Homer H., Capt., USA
HAYNES, Herbert C., Capt., USAF
HEINSTRA, Fred A., Lt. Col., USAF
HUGHES, Frederick J., Jr., Lt. Col., USA
HURSH, Laurence M., Lt. Col., USA
JACOBS, Paul H., Capt., USAF
JAFFURS, William J., Capt., USA
KARSTENS, Andres I., Lt. Col., USAF
KIDDELL, Charles K., Maj., USA
KIERSCH, Theodore A., Lt. Col., USA
KOLB, Earl J., Jr., Capt., USAF
KONWINSKI, Edward S., Capt., USA
KRATOCHVIL, Clyde H., Capt., USAF
KROYER, John M., Capt., USA
LANCE, Paul E., Lt. Col., USAF
LARSON, Arlan P., Capt., USA
LeGOLVAN, Paul C., Lt. Col., USA
MANOGUE, Edmund J., Capt., USAF
McCABE, Lloyd B., Capt., USA
McCARROLL, William H., Col., USAF
MINYARD, A. E., Capt., USAF
MOORE, William S., Lt. Col., USA
MURPHY, Paul D., Capt., USAF
MYERS, Harold A., Col., USAF
ORBISON, James A., Lt. Col., USA
PARKER, Henry S., Lt. Col., USA
PARTYKA, Leo C., Capt., USAF
PEDROTTY, Francis W., Jr., Capt., USA
PETERSON, William F., Maj., USAF
RANSONE, James W., Capt., USA
RICE, J. Sidney, Lt. Col., USA
RICHARD, Eli F., Capt., USAF
RING, Dean M., Capt., USAF
SARGENT, Carlton W., Lt. Col., USA
SCHULTE, John W., Capt., USA
SEDLACEK, Richard L., Maj., USAF
SMITH, William T., Lt. Col., USA
STEIN, Ignatius J., Maj., USAF
THOMPSON, James M., Capt., USAF
TKACH, Walter R., Maj., USAF
TREDICI, Thomas J., Capt., USAF
TURNER, David A., Capt., USAF
TURNER, William R., Maj., USAF
VORDER, Colin F., Lt. Col., USA
WALTON, Lowell C., Maj., USAF
WEBSTER, John G., Capt., USAF
WEVER, Robert C., Capt., USA
WHITE, Claude B., Col., USAF
WILLIS, John M., Jr., Lt. Col., USA
WOLTER, David F., Capt., USAF

MEDICAL SERVICE CORPS

ARNBERG, Wilber H., Capt., USA
BOECKMAN, Franklin P., Lt. Col., USA
BOST, William L., Capt., USA
CARTER, James A., Lt. Col., USA
COATS, James G., Lt. Col., USA
COOK, Richard A., Capt., USA
COUSINS, Owen De F., Lt. Col., USA
DELAHUNT, John C., Maj., USAF
ERNE, Walter F., Capt., USA
FERGUSON, Harry A., Lt. Col., USA
FOUBARE, Louis H., Capt., USA
FRAZEE, Edward B., Lt. Col., USA
FREY, Clarence V. P., Lt. Col., USA
GORRELL, Charles J., Maj., USA
GULLEY, Wayne E., Capt., USAF
HAASE, Frederick J., Lt. Col., USA
HANDORF, William G., Maj., USA
HASTINGS, William C., Lt. Col., USA
HAWKINS, Lewis L., 1st Lt., USA
HEDLUND, James L., Capt., USA
HENDERSON, Clyde W., Lt. Col., USA
HINO, Chester T., Capt., USA
HODGE, Joseph E., Capt., USAF
HOOVER, Chris D., Lt. Col., USA
HUNT, Albert B., Lt. Col., USA
KEEGAN, Hugh L., Maj., USA
KILLMAN, Frank, Jr., Lt. Col., USAF
LaCOMBE, James L., Lt. Col., USA
LAUTERBACH, Carl G., Capt., USA
LAWFORD, Frank K., Lt. Col., USA
LeMIRE, Joseph A. W., Lt. Col., USA
LINDSAY, Charles W., Jr., Maj., USAF
LINDSAY, Eugene K., Capt., USAF
McCLURE, Warner D., 1st Lt., USA
McFAYDEN, Ross M., 1st Lt., USA
MERRIKEN, John E., Lt. Col., USA
MILLER, Robert C., Lt. Col., USA
MONNEN, Millard C., Lt. Col., USA
MORRISON, Manley G., Lt. Col., USA
MULRENIN, Bernard K., 1st Lt., USA
MURPHY, Donald B., Capt., USA
NEWTON, Carlos E., Jr., Capt., USA
PAXSON, Earle A., Capt., USA
PENDLYSHOK, Charles A., Lt. Col., USA
PETERSON, Donald L., 1st Lt., USA
RAMTHUN, Gerald A., 1st Lt., USA
REBER, John A., 1st Lt., USA
RICHARDS, James T., Lt. Col., USA
RICHARDSON, Floyd G., Capt., USAF
SANDERS, Arvey C., Lt. Col., USA

MEDICAL SERVICE CORPS—Continued

SCHEIN, Edgar H., Capt., USA
SHEEHAN, Gerard J., Lt. Col., USA
SMITH, Grayson, Capt., USA
STITH, Marion C., Lt. Col., USA
STOUT, Arthur O., Lt. Col., USA
SULLIVAN, Robert E., Capt., USAF
TAYLOR, Emerson B., Lt. Col., USA
THOMPSON, Joseph C., Lt. Col., USA
WALDEN, Jack T., Lt. Col., USA
WALKER, Herman A., Lt. Col., USA
WASHBURN, Robert E., Maj., USAF
WHITTEMORE, Frederick W., Jr., Lt. Col., USA
YOUNG, James J., Capt., USA
ZURCHER, John J., III, Lt. Col., USA

DENTAL CORPS

CHRISTENSEN, John P., Lt. Col., USA
COOK, Donald L., Lt. Col., USA
JOHNSTON, Leonard S., Jr., Maj., USAF
LINN, Scott D., Lt. Col., USA

VETERINARY CORPS

GLOWA, Latimer W., Lt. Col., USA
LUKER, Charles T., Maj., USA
MASSIE, Erby L., Capt., USAF
MILLER, Everett B., Maj., USA
NEURAUTER, Lloyd J., Maj., USAF
REID, Joseph E., Maj., USA
SMITH, George D., Capt., USAF
WATSON, William H., Capt., USAF

NURSE CORPS

BENSTON, Martha L., Maj., USAF
BOYLE, Patricia I., Maj., USAF
BRIMMER, Aileen E., Maj., USAF
ECHOLS, Hilda R., Maj., USAF
ELSER, Florence F., 1st Lt., USAF
ENTRIKIN, Sara W., Maj., USAF
HOHBERGER, Ernestine F., Maj., USAF
KESSLER, Doris M., 1st Lt., USAF
KOVACK, Ethel R., Maj., USAF
SCHULTZ, June B., Maj., USA
SUESS, Helen V., 1st Lt., USA
TAGUE, Lena M., Capt., USA
THRUSH, Patricia A., Capt., USA
TRAVERS, Veronica R., Capt., USA
TWOHEY, Barbara J., Capt., USA
VARNER, Marjorie L., Capt., USA
VERHONICK, Phyllis J., Capt., USA
WEEKS, Nelda L., Capt., USA
WEIRICK, Lenora B., Capt., USA
WILCOX, Mildred A., Capt., USA
YORK, Elta R., Capt., USA
YORK, Elva M., Capt., USA

ARMY MEDICAL SPECIALIST CORPS

ADAMS, Rachel H., 1st Lt., USA
BEN DURE, Mary L., Maj., USA
EASON, Martha J., Capt., USA
FAUBLE, Phyllis H., Capt., USA
FORSYTHE, Lois M., Maj., USA
GLIDDEN, Dorothy I., Capt., USA
JAAKKOLA, Irma L., Capt., USA
JONES, Elizabeth C., Maj., USA
KENNON, Barbara L., Capt., USA
LEONARD, Katharine, Maj., USA
MOSEMAN, Martha E., Maj., USA
NESS, Alene V., Maj., USA
OWEN, Catherine M., Capt., USA
RYAN, Barbara M., Maj., USA
SHERBURNE, Jeanne, 1st Lt., USA
WILLIAMS, June E., Capt., USA

WOMEN'S MEDICAL SPECIALIST CORPS

MOTLEY, Dellamae, Maj., USAF
DEMINY, Elsie L., Capt., USAF
LARUE, Jack, Maj., USAF

The following officers of the military medical service on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

MEDICAL CORPS

ABRAM, Albert W., Lt., USN
ADAMS, Carlton Z., Lt., USN
AHERN, James K., Lt., USN
AIMENHOFF, Irwin A., Lt., USN
ALDRIDGE, John S., Lt., USN
ALLARD, Charles, Lt., USN
BAIRD, Robert L. S., Lt., USN
BAKER, John M., Lt., USN
BARNETT, Charles G., Lt., USN
BARTON, Theodore C., Jr., Lt., USN
BAUER, Robert E., Lt. Comdr., USN
BELCHER, Stanley M., Lt. Comdr., USN
BERG, John J., Lt. Comdr., USN
BISHOF, Calvin F., Lt., USN
BLANK, Richard H., Lt., USN
BRINSLEY, Bertram, Lt., USN
BROWNE, Edward W., Jr., Lt., USN
BRUSCHI, Walter C., Lt., USN
BULLARD, Lubin F., Jr., Lt., USN
BURNHILL, Michael S., Lt., USN
CALIGUIRI, Joseph V., Lt. Comdr., USN
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CARTER, Edward R., Lt., USN
CHRIST, Jacob, Lt., USN
CLINE, Thomas J., Lt., USN
COHEN, Louis, Lt., USN
COHEN, Nathaniel, Lt., USN
CONSOLO, Salvatore A., Lt. Comdr., USN
CUMELLA, Joseph, Lt., USN
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CURTIS, Robert J., 1st Lt., USAF
DANZIG, Irwin S., Lt. Comdr., USN
DESPREZ, Renkert J., Lt. Comdr., USN
DIETZ, Mortimer W., Lt. Comdr., USN
DONNENFELD, Robert S., Lt., USN
DOPPMAN, John L., Lt., USN

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DOUGLASS, Carleton C., Lt. Comdr., USN
DUNAUANT, William D., Lt. Comdr., USN
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ELUTO, Channing E., Lt. Comdr., USN
FENNEL, Peter J., Lt., USN
FERNANDEZSARIEGO, G., Lt., USN
FILIPPONE, Ames L., Jr., Lt., USN
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FORESTA, Francis A., Lt., USN
GALLAGHER, John D., Lt., USN
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GEISERT, Frederick E., Lt., USN
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HAHN, Robert F., Lt., USN
HANCOCK, Edward H., Jr., Lt., USN
HARRIS, Joseph H. W., Lt., USN
HAYWOOD, Lemuel J., Lt., USN
HOROWITZ, Melvin S., Lt., USN
JAMES, Arthur D., Lt., USN
JONES, Benjamin B., Lt., USN
KAESE, Werner E., Lt., USN
KARR, Samuel L., Lt., USN
KATIMS, Robert B., Lt., USN
KENT, Howard R., Lt. Comdr., USN
KINDER, Eugene J., Lt., USN
KING, Marion F., Lt., USN
KIRSTEN, Walter T., Lt., USN
KISHNER, Leonard L., Lt. Comdr., USN
KRAFT, Richard O., Lt., USN
KUPKE, Melvin F., Lt. Comdr., USN
LAHASKY, Jacob R., Capt., USAF
LORD, John D., Lt., USN
LORELLO, Robert J., Lt., USN
LUCHI, Robert J., Lt., USN
LUTTERLOH, Isaa H., Jr., Lt., USN
LYNCH, Michael F., Lt., USN
LYONS, Howard H., Lt. Comdr., USN
MacDONALD, Randolph F., III, Lt., USN
MAFFLY, Leroy H., Lt., USN
MARKEE, Alan S., Lt., USN
MARTIN, Owen, Lt. Comdr., USN
McCORD, Donald L., Lt., USN
McCOY, John T., Lt. Comdr., USN
McGEHEE, John M., Lt., USN
MEDIC, Walter T., Lt., USN
MEDKANIK, Edwin A., Lt. Comdr., USN
MILLER, Cameron E., Lt. Comdr., USN
MORRIS, John W., Lt., USN
MURRAY, Richard D., 1st Lt., USAF
NELSON, Pierce D., Lt. Comdr., USN
OTHERSEN, Henry B., Lt., USN
OUDENHOVEN, Richard C., Lt., USN
PACKER, James T., Lt., USN
PENNINGTON, Vanis, Lt., USN
PETERSON, Clare H., Lt., USN
PIPER, Charles E., Jr., Lt., USN
RAGLIONE, Ugo W., Lt., USN
RAISBECK, Clifford C., Jr., Lt., USN
RAMSDELL, Robert C., Lt., USN
ROBERTSON, Leon W., Lt. Comdr., USN
ROBINSON, Paul I., Maj. Gen., USA
ROGOFF, Stanely M., Lt. Comdr., USN
RULISON, Clyde A., Lt. Comdr., USN
SALZMAN, Morris, Lt. Comdr., USN
SARVER, Robert O., Lt., USN
SCALIA, Samuel P., Lt. Comdr., USN
SCHAEFFER, Charles D., Lt. Comdr., USN
SCHWARTZ, Jack W., Brig. Gen., USA
SENCINDIVER, Paige V., Lt., USN
SMALL, David E., Lt. Comdr., USN
SMITH, Francis J., Lt. Comdr., USN
SOLSBERG, Jay I., Lt., USN
SPURGEON, Frederick C., Lt., USN
STAHL, Martin B., Lt., USN
STARR, Jason L., Lt., USN
STELLER, Frederick C., Lt. Comdr., USN
St. JOHN, Clement F., Brig. Gen., USA
STORY, Frederick L., Jr., Lt., USN
SWEARINGEN, Robert E., Lt., USN
SWYER, Alfred J., Lt. Comdr., USN
SYMS, Charles A., Lt., USN
TAYLOR, Frederick F., Lt., USN
TEICHNER, Ronald, Lt., USN
TESSLER, Arthur N., Lt., USN
THANNISCH, George E., Lt., USN
TRAEGER, Henry S., Lt. Comdr., USN
WAIFE, Sholom O., Lt. Comdr., USN
WAITE, Charles L., Lt. Comdr., USN
WELLS, Peter F., II, Lt. Comdr., USN
WELZ, Wenner K. R., Lt. Comdr., USN
WICKSMAN, Robert S., Lt. Comdr., USN
WIENER, Jacob J., Lt., USN
WILSON, Edwin R., Lt., USN
WILSON, James E., Jr., Lt., USN
WOODCOCK, John A., Lt. Comdr., USN
WRIGHT, Allan W., Lt., USN
WU, William L., Lt. Comdr., USN
WURZELBACHER, Richard T., Lt., USN
WYDRZYNSKI, John J., Lt. Comdr., USN

VETERINARY CORPS

BERGER, Joseph H., Lt. Col., USAF
JOHNSON, Harold M., Capt., USAF
KYNER, Roy E., Lt. Col., USAF
SLIDER, Howard B., Maj., USA
WILSON, Curtis L., Jr., Capt., USAF
YAGER, Robert H., Col., USA

MEDICAL SERVICE CORPS

ALLEN, Harold M., Capt., USA
BANKSTON, Homer F., 1st Lt., USA
BECKHALL, James H., Capt., USA
BELLOR, James R., 1st Lt., USAF
BENNETT, Dee, Jr., Capt., USA
BIELER, Edward P., 1st Lt., USAF
BROWN, Jerome, Capt., USA
CHEPPELLE, Harold H., 1st Lt., USAF
COY, Malcolm L., Capt., USA
DUTTWEILER, David W., Capt., USA
FAIRBAIRN, Henry A., Capt., USA
FINN, John L., Capt., USA
FISHER, Jackie V., 1st Lt., USAF
FUEBRIGHT, Keith N., 1st Lt., USAF
GARDNER, Robert, Capt., USA
GREGORY, Harold G., Maj., USAF
HOFFMAN, John E., 1st Lt., USAF
HOPKINS, Cecil W., Capt., USAF
HURT, Andrew, Capt., USA
ISRAELOFF, Joseph, Capt., USA
JACKSON, Thames E., Jr., 1st Lt., USAF
JACOBSEN, William G., 1st Lt., USAF
JANVIER, Robert, 1st Lt., USAF
JOHNSON, Howard A., Jr., Capt., USA
KANEKARIS, George A., 1st Lt., USAF
KAPLAN, William, Capt., USAF
KINGSLEY, Leonard, 1st Lt., USA
KLARKOWSKI, Frank G., Capt., USA
KOHR, Roland E., 1st Lt., USAF
LASKOWSKI, Clarence, Capt., USA
LILLIE, Charles R., Capt., USAF
LUCE, Richard D., 1st Lt., USAF

MEDICAL SERVICE CORPS—Continued

LUDLUM, James E., 1st Lt., USAF
MALONEY, James T., 1st Lt., USAF
MALOY, John E., Capt., USA
MARTIN, Robert P., Capt., USAF
MARTINO, Charles W., 1st Lt., USAF
McKAY, John D., 1st Lt., USAF
MERFY, Robert F., Maj., USAF
MEYER, Albert M., Capt., USAF
MILLER, J. A., 1st Lt., USAF
MILLS, Ralph B., Capt., USAF
MOORE, Earl L., Lt. Col., USAF
MORGAN, Lorn L., Capt., USA
MOTZKO, Donald H., Capt., USAF
NORRELL, Oliver L., Jr., Capt., USA
NYSTROM, Rudolph, Jr., Capt., USA
OKANO, Thomas M., 1st Lt., USAF
PENLAND, William A., 1st Lt., USAF
PITASCH, Harris G., 1st Lt., USAF
PODKIN, Albert, 1st Lt., USAF
PROSSER, George W., Jr., 1st Lt., USAF
RAMSEY, Wade C., Maj., USAF
RENO, Clarence, Maj., USAF
ROCKFORD, Edmund, Sr., Maj., USAF
SCHIFFER, Alfred C., 1st Lt., USAF
SCHOFIELD, James B., Jr., Capt., USAF
SCHWARTZ, Elmer, 1st Lt., USAF
SEIDLER, Paul D., 1st Lt., USAF
STONBRAKER, Kenneth D., Capt., USA
STROUD, Herschel L., 1st Lt., USAF
STUMP, Theodore H., 1st Lt., USAF
SUETHOLZ, Joseph W., 1st Lt., USAF
THEOPHILKOS, Lester J., 1st Lt., USAF
THERIEN, Gilbert C., 1st Lt., USAF
THORPE, Peter B., 1st Lt., USAF
TUBIS, Richard A., 1st Lt., USAF
UTSLER, Gene R., 1st Lt., USAF
WAGNER, Mervyn K., 1st Lt., USAF
WALLACE, Johnny C., Maj., USAF
WICHERS, Max F., 1st Lt., USAF
ZINNER, Leon, Capt., USAF

NURSE CORPS

ABSHIRE, Joy L., Capt., USA
ANTONUCCI, Henrietta H., Capt., USA
AYCOCK, Erline T., Capt., USA
BAGIN, Isabelle J., Capt., USA
BARBER, Mary E., Lt., USN
BARRON, Joan L., Lt., USN
BARTON, June M., Capt., USA
BEDARD, Evelyn M., Maj., USAF
BENNETT, Joan M., 1st Lt., USAF
BENNETT, Marjorie J., Capt., USA
BLANCO-COLON, Ana, Capt., USA
BOURQUEIN, Rita C., 1st Lt., USAF
BOWMAN, Betty O., Capt., USA
BRALEY, Ann I., Capt., USA
BRANTLY, Ruth S., Capt., USA
BRYANT, Joan E., 1st Lt., USAF
BUCKINGHAM, Louise A., Lt., USN
BUSTRUCK, Stella M., Capt., USA
CARNEY, Jeanne A., 1st Lt., USAF
CHADWICK, Katherine, Lt., USN
CLEMMONS, Loneeta J., 1st Lt., USAF
COGHILL, Margaret J., Capt., USA
COLE, Vivian M., Capt., USAF
COLON, Angela L., Capt., USAF
CONNORS, Patricia E., Capt., USA
DECK, Violet E., Capt., USA
DELANEY, Marion P., Capt., USA
DeMUTH, Mary N., Capt., USA
DeROCHE, Ruth D. K., Capt., USA
DESOTELL, Ruth L., Capt., USA
DOWER, Kathleen S., Capt., USA
DOWLING, Alice L., Capt., USAF
DUKE, Phyllis M., Capt., USA
DUNN, Lucille M., Capt., USA
FILOSA, Carmela, Capt., USA
FITZ, Barbara O., Lt., USN
FOISTER, Daryle E., Capt., USA
FOLEY, Ruth M., Maj., USAF
FRAZIER, Doris S., Capt., USA
FRISTAD, Fern E., Capt., USA
FRITZ, Mildred C., Capt., USA
FUKUDA, Kay K., Capt., USA
FULLER, Doris T., Lt., USN
GANNON, Lois A., Capt., USAF
GILES, Mary E., Capt., USA
GUY, Theda E., Capt., USA
HALL, Olivia B., Capt., USA
HAMILTON, Shirley M., Capt., USA
HARRIS, Mary M., Capt., USA
HARRIS, Rosalia M., Capt., USA
HARROD, Betty H., Capt., USA
HARVEY, Marian V., Capt., USA
HELVERSON, Virginia E. A., Capt., USA
HERBERT, Dallabelle, Lt., USN
HERRIN, Nezzie M., Capt., USA
HIGHTOWER, Nellie R., Capt., USA
HILL, Gretchen S., Lt., USN
HOLTZ, Dorothy M., Capt., USA
HORAN, Lorena F., Capt., USA
HUEBERT, Helen M., Capt., USA
HUSTON, Margaret A., Capt., USAF
JANK, Paula T., Capt., USA
KNOX, Barbara E., Capt., USA
KOPP, Rachel R., Capt., USA
KREINHOP, Margie J., Capt., USA
KUTYLA, Mary M., Capt., USA
LEARY, Frances J., Capt., USA
LEHMAN, Helen F., Capt., USA
MACKIN, Gertrude, Capt., USA
MARUSIC, Rose A., Capt., USA
MATTHIAS, Charlotte E., Capt., USA
McCAUSLAND, Muriel J., Capt., USA
McCONNELL, Amy L., Capt., USA
McDONNELL, Grace W., Capt., USA
McKINNEY, Sarah J., Capt., USA
McLEAN, Mary F., Capt., USA
MICHELIN, Thelma M., Capt., USA
MORRIS, Marie L., Capt., USA
MOWERY, Ruby L., Capt., USA
NALLY, Barbara V., Capt., USA
NISHILYAMA, Masako, Capt., USA
O'NEAL, Mary E., Capt., USA
ORSBORNE, Zoe L., Capt., USA
PAWLING, Helene M. N., Capt., USA
POTTER, Elizabeth, Capt., USA
PRUSKA, Sophia A., Capt., USA
RAMIREZ, Rosa J., Capt., USA
RICHERSON, Phyllis M., Capt., USA
ROGERS, Maggie A., Capt., USA
RUISH, Mary M., Capt., USA
STRAUT, Klara H., 1st Lt., USAF
WILHITE, Mary F., 1st Lt., USAF

WOMEN'S MEDICAL SPECIALIST CORPS

GRASS, Rebecca J., 1st Lt., USAF
McCONNELL, Elizabeth, Capt., USAF
MERGENS, Patricia R., 1st Lt., USAF
REARDON, Joan A., 1st Lt., USAF
UNDERKOFLER, Audrey A., Lt. Col., USAF
VAN ALST, Helen C., Capt., USAF

FIRST WOMAN CAPTAIN IN NAVY MEDICAL CORPS

Captain Gioconda R. Saraniero (MC) USN is the first woman in the Navy Medical Department to be promoted to the grade of Captain. She was sworn in on 4 November 1955 at Naples, Italy, where she was completing a tour of duty at the Station Hospital. Captain Saraniero recently reported for duty at Navy's Bureau of Medicine and Surgery.

Rear Admiral Bartholomew W. Hogan, Surgeon General, United States Navy, congratulates Captain Saraniero on her promotion.

A graduate of Woman's Medical College of Pennsylvania in 1935, Captain Saraniero's naval service began in October 1943, when she was assigned to the Naval Dispensary in Washington, D. C. She also has served at the U. S. Naval Hospitals, St. Albans, L. I., N. Y., and Philadelphia, Pa., and at the U. S. Naval Medical School, Bethesda, Md.

The Regular Navy at present has five women Medical Corps officers and sixteen women Medical Service Corps officers on active duty.

MEDICAL AND DENTAL SYMPOSIUM

A three-day Medical and Dental Symposium for the Armed Forces has been scheduled for 21, 22, and 23 March 1956. The theme topic is "Developments in Military Medicine and Dentistry With Special Emphasis on Atomic Warfare, Special Weapons, and Isotopes."

The meeting on the first day will be conducted at the U. S. Naval Hospital, Chelsea, Mass. On the mornings of the second and third days clinics will be scheduled at various hospitals in the city of Boston on the "Treatment of Diseases With Radio-active Isotopes." Afternoon lectures will be given at the Jimmy Fund Foundation Building and in the auditorium at the New England Deaconess Hospital.

Among the prominent speakers are the Honorable Christian Herter, Governor of the Commonwealth of Massachusetts; Frank Berry, M. D., Assistant Secretary of Defense (Health and Medical); Rear Admiral Bartholomew W. Hogan (MC) USN, Surgeon General of the Navy; Rear Admiral Ralph W. Malone (DC) USN, Assistant Chief of Bureau of Medicine and Surgery for Dentistry; Brigadier General Elbert DeCoursey, MC, USA, Commanding Officer of the Army Medical Service School; Captain George M. Lyon, Assistant Chief Medical Director for Research and Education, U. S. Veterans Administration, Washington, D. C.; Charles L. Dunham, M. D., Director, Division of Biology and Medicine, U. S. Atomic Energy Commission; and Captain Shields Warren (MC) USNR, Professor of Pathology, Harvard Medical School, and formerly Director of the Division of Biology and Medicine, U. S. Atomic Energy Commission.

Programs and additional information may be obtained by addressing the District Medical Office, First Naval District, 495 Summer Street, Boston 10, Mass. This Symposium has been approved for retirement point credit for those in attendance who are on the Active Status List in the Armed Services Reserve Programs.

DEATHS

ADKINS, Claude Emerson, Commander (DC) USN, Bremerton, Wash.; U. S. Naval Hospital, Bremerton; graduated in 1929 from the Kansas City Western Dental College, Kansas City, Mo.; commissioned a Lieutenant (junior grade) 28 July 1931; died 30 December 1955, age 55, at the U. S. Naval Hospital, Bremerton, of acute monocytic leukemia.

CROUSE, Jervace Letha, Lieutenant Commander (NC) USN, Columbiana, Ohio; U. S. Naval Hospital, Bethesda, Md.; graduated in 1927 from the St. Luke's Hospital School of Nursing, Cleveland, Ohio; appointed a Nurse in the Naval Reserve Corps in 1938; ordered to active duty in January 1942; commissioned in the Regular Navy in 1947; died 17 January 1956, age 55, at the U. S. Naval Hospital, Bethesda, of melanoma.

FRENCH, John Hoyt, Lieutenant (junior grade) (DC) USNR, Elizabethtown, N. C.; U. S. Naval Dental Clinic, Norfolk, Va.; graduated in 1953 from the University of Tennessee College of Dentistry, Memphis, Tenn.; appointed Lieutenant (junior grade) 8 July 1954; ordered to active duty 25 August 1954; died 23 December 1955, age 25, at Stokes, N. C., of injuries received in an automobile accident.

HEWITT, Wayne Bodle, Lieutenant Commander (MSC) USN, San Diego, Calif.; Military Advisor Group, Tsoying, Taiwan, Formosa; entered the naval service in 1929; appointed a warrant pharmacist in 1942; promoted to Lieutenant Commander in the Medical Service Corps in 1954; died 4 January 1956, age 44, at Tsoying, Formosa, of pulmonary edema.

The following notice appeared in the 7 January 1956 issue of the *Journal of the American Medical Association:*

NOTICE TO ALL MILITARY SERVICE MEMBERS OF THE A. M. A.

Each year a large percentage of membership cards sent to military service members are returned to the Membership Department at A. M. A. headquarters because the address is incorrect. Beginning in 1956, service membership cards will not be sent to service members until the member has sent a postcard or a letter informing this office where the card is to be sent. In this way the member will be sure of receiving his membership card, and it will obviate further correspondence in order to try to find out the proper address of the member.

Reviews of Recent Books

TEXTBOOK OF ENDOCRINOLOGY, edited by *Robert H. Williams*, M. D. 2d edition. 776 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.

This second edition is a complete, comprehensive, and well-illustrated textbook of endocrinology that will serve as a valuable reference for the endocrinologist, internist, gynecologist, and general practitioner. The author obtained contributions for this book from outstanding authorities on various aspects of the subject. The material is presented in a chronologic and orderly manner, and the format is excellent. The discussions of laboratory procedures, diagnostic methods, clinical signs and symptoms, complications, treatment, and available drugs are current and up-to-date, and the subjects are presented in sufficient detail to make this a most valuable reference text. The book is accurately and completely indexed, and references to the literature for each section are complete, current, and listed by subject as well as alphabetically. This book is well balanced and each aspect of the subject of endocrinology is thoroughly presented.

The section covering the thyroid gland is particularly well documented and organized. Photographs, charts, and graphs, in color as well as black and white, are well selected, and these materially assist the reader in assimilating and understanding the material presented.

This book is most valuable to any student or practicing physician as an authoritative and reliable guide concerning the problems pertaining to endocrinology. For all who are interested in endocrinology this most comprehensive and pleasingly written work is a must. It is enthusiastically recommended. —*RALPH D. ROSS, Comdr. (MC) USN*

THE THYROID: A FUNDAMENTAL AND CLINICAL TEXT. Sixty Contributors. *Sidney C. Werner*, M. D., Sc. D. (Med.), Editor. 789 pages; illustrated. Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, N. Y., 1955. Price $20.

In this first edition a group of 60 well-known specialists in the fields of basic science, laboratory and animal investigation, clinical research, and therapeutics present an exceptionally comprehensive and authoritative treatise on the present-day knowledge of the thyroid gland. The book is divided logically into three sections. Part 1 presents the fundamental biochemical, physiologic, and histologic aspects of the normally functioning thyroid; Part 2 includes a thorough discussion of laboratory methods for evaluating thyroid activity; and Part 3, comprising approximately two thirds of this book, considers all of the well-known diseases of the thyroid.

The text is well printed, easily read, and well-documented throughout by frequent numerical references which are listed at the end of each chapter. A critical appraisal of various hypotheses concerning the pathophysiology of thyroid disturbances is presented. The 225-page section on hyperthyroidism covers in an unbiased manner the pros and cons of all methods of therapy in this disorder.

In a volume having such a large number of contributors, it is impossible to avoid some degree of repetition as a result of overlapping fields of discussion by the various authors. Nevertheless, throughout the book a unified and well-correlated concept is presented as a result of frequent contributions by the editor whose total efforts comprise more than 10 per cent of the entire text.

This book is a most valuable contribution to the field of clinical medicine. It will be of primary interest to physiologists, endocrinologists, internists, and surgeons, but will serve also as a valuable reference for all who are interested in the many aspects of thyroid function and thyroid disease in man.—*ROBERT N. CLASS, Maj., USAF (MC)*

GENERAL ENDOCRINOLOGY, by *C. Donnell Turner,* Ph. D. 2d edition. 553 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.

This is the second edition of a textbook that first appeared several years ago. It is written from the standpoint of the student in biology or zoology and would serve well as a text in either of these fields. The anatomy, biochemistry, and physiology of each endocrine gland is thoroughly reviewed. The effects of abnormalities in the output of the various hormones on living organisms are described and there are discussions of each of the human endocrine disorders. Treatment of the endocrine diseases is covered only incidentally and could not be considered adequate for clinical use. There also are chapters discussing adaptive reactions to stress, the biology of sex and reproduction, and endocrine-like mechanisms. The subject of the "general adaptation syndrome" was especially well covered and of particular interest.

The volume is attractively printed and illustrated, with an adequate bibliography at the end of each chapter. This volume is especially suitable for the use of students of biology at the college level or of physicians who desire a thorough-going review of the subject of endocrinology as a basic science. It would not be recommended to a general practitioner as a clinical text but could well find a place in the library of physicians confining their practice to the specialized field of endocrinology. —*JOHN E. GORMAN, Comdr. (MC) USN*

NEW CONCEPTS IN SURGERY OF THE VASCULAR SYSTEM, by *Emile Holman,* M. D. 108 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $3.50.

This timely and interesting little monograph is one of the "American Lectures in Surgery" and consists of two papers delivered by the author to surgical groups.

The first paper is entitled "The Immediate and Late Treatment of Arterial Injuries" and deals with recent advances in this field. The purpose of this section is avowedly not to cover the whole field of vascular surgery, but to review some of the revolutionary changes that have occurred in the recent past in the treatment of arterial injuries, including some of the interesting physiologic phenomena associated with these injuries. This it does in a clear and concise fashion. The text is accompanied by many pictures and drawings, and a few pertinent tables, and points up the importance of such factors as the unlimited availability of antibiotics, well-trained personnel, blood and plasma expanders, improved transportation, and proper instruments and sutures, and the development of preserved homografts in making possible the change from vessel ligation to vessel repair. Vascular suture technic, management of arteriovenous fistula, and surgical approaches are described in some detail.

The second paper is entitled "The Significance of Segmental Stenosis and Post-stenotic Dilatation in the Development of Arterial Aneurysms." This section deals with the biologic importance of structural fatigue and the significance of location in the development of aneurysms, and details the mechanism of formation of poststenotic dilatation.

The quality of printing and indexing, the number and scope of charts and illustrations, and the literary style are all good.

This monograph provides a great deal of valuable information for a small investment and should be required reading for all surgeons.

—*BERNARD D. SHERER, Comdr. (MC) USN*

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 61, Art. 2, pages 281-636, May 27, 1955. Editor: *Roy Waldo Miner.* "Hydrocortisone, Its Newer Analogs and Aldosterone as Therapeutic Agents." Conference Chairman and Consulting Editor: *Joseph W. Jailer.* 355 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price $4.50.

This report is an up-to-date consolidation of opinion and research findings in a changing and important field of therapeutic and scientific research. The subject matter is divided into five parts, as follows:

Part 1. "Pharmacology of Hydrocortisone," presented by the Worcester Foundation for Experimental Biology; The National Institutes of Health; Memorial Center for Cancer and Allied Diseases and Sloan Kettering Institute; Harvard Medical School; and the University of Utah College of Medicine.

Part 2. "Use of Cortisone, Hydrocortisone, and Certain Synthetic Steroids in Systemic Disease," presented by Edward W. Boland, Los Angeles; Institute for Metabolic Research at Highland Alameda County Hospital; Johns Hopkins University School of Medicine; Columbia University College of Physicians and Surgeons; and the Mount Sinai Hospital, New York.

Part 3. "Selected Parenteral Forms of Hydrocortisone in Therapy," presented by Harvard Medical College; Columbia University College of Physicians and Surgeons; University of California School of Medicine; Albany Medical College; New York University College of Medicine; and University of Pennsylvania.

Part 4. "The Topical Use of Hydrocortisone," presented by the Medical College of Georgia; University of Cincinnati; New York University; Washington University School of Medicine; Cornell University Medical College; and Henry Ford Hospital.

Part 5. "Halogenated Analogs of Hydrocortisone," presented by The Squibb Institute for Medical Research; Harvard Medical School; New York University; Stanford University School of Medicine; and the Mayo Clinic.

A great deal of the subject matter is technical in nature and would be of value primarily to research workers and those trained in details of organic chemistry. The general tone of the *Annals,* however, is toward clinical medicine: for instance, the use of the various steroids, including synthetics such as metacortandracin, in treatment of rheumatoid arthritis, asthma, ulcerative colitis, et cetera, is discussed in detail. The goal is to find a steroid, synthetic or derivative of naturally occurring agents, that can be given in relatively small dosage over long periods of time without causing the serious side effects of the currently available agents. The halogenated analogs of hydrocortisone such as fluorohydrocortisone seem to be a step in this direction.

This book very appropriately closes with an article by Philip S. Hench as coauthor on "Effects of Aldosterone, Fluorohydrocortisone, and Metacortandracin in Rheumatoid Arthritis," because he was a prominent early worker in the therapeutic aspects of ACTH and cortisone. Generally, this volume is an excellent reference book for any physician or surgeon using steroid therapy.—*U. R. MERIKANGAS, Col., MC, USA*

PATHOLOGY FOR THE SURGEON, by *William Boyd,* M. D. 7th edition. 737 pages; 547 illustrations including 10 in color. W. B. Saunders Co., Philadelphia, Pa., 1955.

Eight years have elapsed since the last edition of this venerable work, now 30 years old and passed through six previous editions. But the productiveness and progress of medical science make the seventh edition a new book rather than a revision. To steal words from Boyd himself, it is new wine in a new bottle. It is still of Boyd's finest Canadian vintage but with new format, new content, new title. Cushing, Matas, Cohnheim, and Galen still get their due, but about half of the references are more recent than the last edition (1947).

The book is not a compilation of descriptions of gross and microscopic anatomy to assist the resident in pathology in the study of surgically excised tissues. The scope of the work is the pathology of the diseases which are confronted in surgical practice. The descriptions of morbid

anatomy are only part of the approach to giving the clinical surgeon an understanding of the disease processes that he treats in the clinic and the operating room. The title points up this aim: the content fulfills it.

Whenever a subject involves any element of controversy, Boyd pleasantly but judiciously presents each facet of the die. This is a thing he does well. Greene on the biologic criteria of malignancy and Broders on grading are on the same page; Clemmesen and Hueper are together in the paragraph covering the current flurry on bronchogenic carcinoma. Like the photographs, this feature will be deeply appreciated by the resident studying for his "boards," or the clinician who is brushing his memory for the next CPC.

There are many illustrations of excellent quality. Nearly 90 per cent of the illustrations are photographs rather than sketches. There are a few typographical errors and a few apparent internal inconsistencies. The bacteriology is hazy, and the material devoted to shock, burns, frostbite, and anuria is sketchy and weak. No surgeon who is a specialist in a particular region will be in complete agreement with the coverage of his special field. On the whole, the general surgeon (a vanishing breed) should be pleased.— *DOUGLAS LINDSEY, Lt. Col., MC, USA*

HUMAN PATHOLOGY, by *Howard T. Karsner,* M. D., LL. D. 8th edition. 960 pages; 557 illustrations in black and white and 19 subjects in color on 14 plates. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $15.

That this textbook of pathology has now reached its eighth edition is a testimonial to its usefulness over a long period of time, stretching from its initial writing in 1926 to the present date. The present volume is no exception to its predecessors. It has been extensively revised and brought up to date by the inclusion of a number of new subjects, the rewriting of some sections, and the revision of many others. The book is as modern as it is possible to make any text.

The work follows the same general plan as the previous edition. It is divided into two parts, general and systematic pathology, the first division serving as a good introduction to the chapters on organ system pathology. The field of pathology is covered completely and the grouping of subjects is well done. In some instances, however, rearrangement of the text might make the book more usable as a reference. For example, histoplasmosis is not presented with the fungi in the chapter on infectious granulomas and discussion of helminth infestations is presented in several chapters. The reviewer believes that Hodgkin's disease should be included among the lymphomas. It might also be well to discontinue the use of certain archaic terms as paragraph headings even though the ensuing discussion indicates the preferred newer terminology.

There are extensive references at the end of each chapter, arranged alphabetically by name, but broken down into broad subject groupings where needed. Investigators' names, greatly quoted in the text, are also a distinct aid in locating specific references. There is a good coverage

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of the more important literature and many of the references are to the latest publications. The book is well bound, legibly printed in double column, and written in a pleasant, readily understandable style.

The text appears to be primarily directed to medical students and the clinical practitioner. Particularly useful should be the clinical correlations with pathologic processes. For more detailed discussions reference to specialized texts and the literature will be required. Despite these minor criticisms the volume is a very useful addition to a rather large number of available textbooks of pathology, and it is highly recommended as a well-written, lucid, broad survey to those interested in human pathology.—*HOWARD A. VAN AUKEN, Col., MC, USA*

SURGERY OF THE STOMACH AND DUODENUM, A Handbook of Operative Surgery, by *Claude E. Welch*, M. D., D. Sc. (hon.). Illustrated by *Muriel McLatchie Miller*. 2d revised edition. 370 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price $9.

This volume is a handbook of technics of surgery of the stomach and duodenum, designed for the intern, resident, and younger surgeon. The first few pages are brief descriptions of anatomy, anesthesia, pre- and post-operative care, and types of incisions. There is a short historical summary of gastric surgery. The last few pages are concerned with early and late complications of gastric operations. The body of the book describes the indications for and the technic of various gastric and duodenal operations. Special points in the pre- or post-operative care of many are mentioned. An adequate bibliography is included.

The text of the book is logically written, clearly printed, and very readable. The illustrations, on which a book of this type must stand or fall, are clear, well drawn, and of sufficient number to enable the reader to follow the steps in the various operations easily. Both the common and many of the less common or outmoded operations are described and illustrated well enough for the neophyte to follow and understand the basic technics.

This book is strongly recommended to the hospital library and to the personal libraries of surgical residents.

—*PHILIP D. CRONEMILLER, Comdr. (MC) USN*

THE YEAR BOOK OF GENERAL SURGERY (1955-1956 Year Book Series), edited by *Evarts A. Graham*, M. D. With a Section on Anesthesia, edited by *Stuart C. Cullen*, M. D. 655 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price $6.

The organization of this yearbook is excellent, in that certain chapters deal with such general subjects as nutrition, antibiotics, et cetera, while the majority of the chapters group the articles anatomically.

Like all yearbooks there are inherent disadvantages to this publication. Many of the articles were published in the literature in early 1954. When the intern or resident reads a series of abstracted articles that

may present radically conflicting viewpoints, he is in danger of becoming confused or is apt to become an "authority quoter."

In keeping with the rapid progress in cardiovascular surgery, there are excellent chapters on the heart and on the aorta and peripheral arteries. The lungs, pleura, thorax, and mediastinum are also extensively discussed, and there is an excellent section on anesthesia.

Of tremendous advantage are the abstracts of a large number of articles from the foreign literature. These are of particular advantage for those doctors who do not have access to a large medical library.

A review of this yearbook should be almost mandatory for all general surgeons in order to become familiar not only with the foreign literature, but also with many articles of merit that were published in local journals or in journals that they ordinarily never read.

—RICHARD S. SILVIS, Capt. (MC) USN

SELECTION OF ANESTHESIA, The Physiological and Pharmacological Basis, by *John Adriani*, M. D. 327 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $6.50.

Dr. Adriani has added another excellent book to his list of publications in anesthesiology. This book is divided into three parts: Part 1 explains in detail much of the outline material in another of his texts, *The Pharmacology of Anesthetic Drugs*. A chapter on "Causes of Operating Room Deaths" is particularly worth noting. Part 2 reviews in detail the management of the patient. There is a concise discussion of the problems relating to geriatric and pediatric patients. Part 3 is concerned with the selection of anesthetic agents.

This book is an excellent source of lecture material for teachers of anesthesiology, and also is an excellent initial review book for neophyte anesthesiologists. The nurse anesthetists should find the simplicity of presentation of Part 1 useful for their consideration of the pharmacology and chemistry of anesthetic agents.

In the text Dr. Adriani has summarized what all teachers of anesthesiology have been constantly striving to emphasize; *i. e.*, that the days of routine gas-ether-oxygen for everyone for everything are numbered.—*ARTHUR B. TARROW, Lt. Col., USAF (MC)*

CLINICAL BIOCHEMISTRY, by *Abraham Cantarow*, M. D. and *Max Trumper*, Ph. D. 5th edition. 738 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.

In the preface to the first edition of this book, published in 1932, the authors indicated that their purpose was to correlate established fundamental biochemical facts with problems encountered daily in clinical medicine. This aim has been effectively continued through the present revision.

The material has been exceptionally well organized to give the reader basic biochemical facts upon which clinically observable metabolic

processes are based. Emphasis is placed on the relation of altered chemistry to disease processes.

The initial chapters discuss the chemistry of fat, carbohydrate, and protein metabolism in relation to disturbed function. Chapters follow on the metabolism of vitally important elements such as calcium, phosphorus, iron, and iodine. The chapters on fluid and electrolyte balance and neutrality regulation are written in a manner that will appeal to the clinician faced with the problem of detecting disturbances in this area and intelligently planning corrective therapy. Considerable space in the text is given to the vital influence of endocrine function on biochemical processes. The laboratory investigation of gastric, pancreatic, hepatic, and renal function is thoroughly explored in a way which brings to the reader clear and concise information on the basis and interpretation of the findings.

Direct references and intensive bibliographies have been eliminated from the text and references to authoritative sources have been substituted. While this may appear to detract from the value of the book as a catalogue of original contributions, it shows the author's familiarity with the subject matter.

This text, long considered a masterpiece in clinical biochemistry, should be read by every physician and surgeon who has experienced difficulty in understanding the vital role of disturbed body chemistry in disease. —*EDWARD C. KENNEY, Capt. (MC) USN*

SEXUAL PRECOCITY, by *Hugh Jolley*, M. A., M. D. (Camb.), M. R. C. P. 276 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $6.75.

This monograph begins with a review of the literature from the earliest reported cases of sexual precocity. Many of these patients were followed into adult life.

The normal sexual development is described, followed by a discussion of the causes of precocity and their differential diagnosis. Many tables are included showing the frequency of the various causes and their sex incidence. Also included is an excellent discussion of pseudohermaphrodism and its treatment including the psychologic considerations in the management of these children.

The second half of the book is devoted to a personal review of histories of 69 patients who were studied by the author. Each case is given in detail with pictures of the patient and pathologic specimens where these were believed to be of interest.

Many of these patients were studied from the time the diagnosis of precocity was made well into adult life. In cases where the patient died, autopsy findings are included in the reports.

This book should be of particular interest to those who are concerned with endocrine problems in children.

—*MARY E. STEINHEIMER, Capt., MC, USA*

KRONFELD'S HISTOPATHOLOGY OF THE TEETH and Their Surrounding Structures, revised and edited by *Paul E. Boyle*, D. N. D. 4th edition. 535 pages; 497 illustrations and 2 color plates. Lea & Febiger, Philadelphia, Pa., 1955. Price $10.

This is the fourth edition of a well-established standard text on oral pathology. The editor has followed the format of previous editions which has proved so successful.

Several important changes have improved the teaching value of the book. The chapter on dental caries has been revised with recent information presented, especially concerning the effects of artificial fluoridation of public water supplies. The chapter on tumors of the oral cavity has been expanded with the incorporation of a discussion on biopsy procedures. The bibliography has been revised by deletion of references no longer pertinent and the inclusion of recent applicable ones.

The illustrations which are such an important part of this text are excellent. A few have been added but the major change is the inclusion of two full-page color plates.

This volume is of prime value in a course in oral pathology for dental students. However, it is also a necessary part of the library of all practicing dentists who wish to have available a concise discussion of the field of dental and oral pathology.—*WILLIAM G. SPRAGUE, Capt., USAF (DC)*

THE YEAR BOOK OF PATHOLOGY AND CLINICAL PATHOLOGY (1954-1955 Year Book Series) edited by *William B. Wartman*, M. D. 486 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price $6.

The purpose of this Year Book is to make available in a single small volume a compilation of abstracts of the significant literature in the field of pathology and clinical pathology for the calendar year 1954. In addition, there are four special articles covering subjects on which considerable new information has accumulated in the last few years. The best of these is a well-written and comprehensive article on the present status of our knowledge of cerebral jaundice (kernicterus) by Dr. Israel Davidsohn. About two thirds of the volume is devoted to pathologic anatomy, and the remainder to clinical pathology.

Both sections are very successful in accomplishing the objective of adequate coverage of the important recent articles. The abstracts are presented in a highly readable style and format, and they usually present the essence of the original article effectively. Doctor Wartman's editorial comments add greatly to the value of the book. There are 168 excellent illustrations which were carefully selected and prepared with meticulous attention to detail. As in the past, the busy pathologist continues to find the *Year Book of Pathology* an easily assimilable epitome of the current literature and a ready source of useful information. This book will be of great value to any physician interested in progress in medical science, but it is particularly recommended for residents in pathology and pathologists.

—*JAMES W. HAYNES, Maj., USAF (MC)*

LIVING BONE IN HEALTH AND DISEASE, by *Irvin Stein*, M. D., F. A. C. S., F. I. C. S., *Raymond O. Stein*, M. D., F. I. C. S., and *Martin L. Beller*, M. D. 510 pages; 387 illustrations. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $15.

This monograph on the physiology and pathology of bone is presented from the viewpoint of biochemistry and fills a very urgent need at this time; consequently it should be of great interest and value to all orthopedists regardless of their stage of development. The authors reveal profound knowledge of the basic sciences involved and a tremendous wealth of pertinent general information. The style is easy to read, and the organization is excellent. Particularly attractive are the numerous clear diagrams and tables, summarizing complicated topics such as kidney function or differential diagnosis of celiac disease and allied conditions, to mention only two examples.

The book is organized in three parts: (1) biochemistry of normal bone, (2) pathologic disturbances, and (3) diagnostic classification of bone diseases discussed in the form of diagnostic tables.

Illustrations are well chosen and excellently reproduced. The index and bibliography are excellent. The only criticism of the book should be a warning to the reader not to accept foreign language references without checking them for correct spelling of bibliographic data, because a considerable number of these foreign references are incorrectly spelled.—*ERNST DEHNE, Lt. Col., MC, USA*

ANESTHESIA IN OPHTHALMOLOGY, by *Walter S. Atkinson*, M. D. 101 pages; 42 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $3.25.

In the foreword to his book on anesthesia in ophthalmology, Dr. Atkinson emphasizes the fact that "good anesthesia saves sight." He devotes the entire book to a discussion of exactly how this important objective is attained.

The book is only 100 pages long, but it covers this subject adequately. The illustrations are clear, pertinent and meaningful. The text is clearly and concisely written with no redundant discussion of the beliefs of various individuals. The author simply states his preference for various procedures and in general explains why he prefers them.

The book covers pre-anesthetic preparation of the patient and the selection of the drugs to be used; limitations to the use of curare; field block for anesthesia of the lids and the lacrimal sac; anesthetic emergencies; use of general anesthesia in ophthalmology, and intravenous and rectal sodium pentothal anesthesia.

The chapter on anesthetic emergencies is alone worth the price of the book. Ophthalmologists tend to ignore this problem because of the use of local anesthesia in most cases with a low incidence of reactions. It will even repay most experienced eye surgeons to re-

read this material to be certain their operating room precautions are adequate.

This book will, of course, have its greatest value for the neophyte in ophthalmic surgery. For him the clarity and conciseness of the text and illustrations will be a godsend. It would also be a most unusual surgeon who would not derive some benefit from the book. It is highly recommended for inclusion in the library of anyone who does or will do ophthalmic surgery.—*VICTOR A. BYRNES, Col., USAF (MC)*

THE CORNEA, by *Charles I Thomas*, M. D. 1,318 pages; 400 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $30.

This book has been written for the physician who is interested in a highly specialized part of the eye. It is an unabridged volume in which the author integrates current knowledge of embryology, anatomy, physiology, and pathologic physiology as it applies to the ophthalmologist's view of the cornea in health and disease. Congenital anomalies and atavistic manifestations are interpreted in the light of comparative anatomy and modern concepts of pathologic functionings. These are particularly clarified and stressed where the subject of the dystrophies is considered. The treatment of corneal diseases are beautifully dealt with and aligned with the concept which demonstrates that certain physiologic mechanisms, in which the autonomic nervous system and endocrines exert important influences, combat resistance to any insult. Throughout this chapter, the radical changes in medical treatments are emphasized; whereas a generation ago Ehrlich's theory of bacteriocidal agents with minimum damage to the tissue was in order, modern chemotherapy with sulfonamides and antibiotics aims at effecting some alteration in the biochemistry of the host to accomplish this end.

The indications and contraindications for corneal operations, together with specific diagnostic methods, are clearly stated. There are many pictures and demonstrations that leave little doubt as to the indicated technic in each procedure.—*A. C. HOHN, Capt. (MC) USN*

ESSENTIALS OF PHARMACOLOGY, by *Frances K. Oldham*, Ph. D., M. D., *F. E. Kelsey*, Ph. D., and *E. M. K. Geiling*, Ph. D., M. D. 3d edition. 520 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $6.

This book is intended to serve as an introductory text in pharmacology. It would not be possible in such a publication to cover the subject completely, but it is designed to present a broad survey of up-to-date pharmacology and to give the student a basis for evaluating current trends and future advances in this field.

No noticeable change has been made in this edition in the method of presentation, which is clear, simple, and suitable for classroom instruction and study. As before, each chapter concludes with a list of important preparations of the drugs discussed and an adequate bibliography.

In some areas, rather extensive changes and revisions have been made. The chapter in the second edition entitled "Miscellaneous Chemotherapuetic Agents" has been replaced by two chapters, one dealing with antitrypanosomal agents and the other with the chemotherapy of tuberculosis and leprosy.

In place of the chapter entitled "Arsenic and Bismuth Compounds," the new edition presents one on "Antitreponemal Agents." This change reflects the present use of penicillin in the treatment of syphilis to the virtual exclusion of the arsenicals.

The sections dealing with antimalarial drugs, antihypertensive agents, the endocrines, and the antibiotics have been extensively revised.

Developments in the field of pharmacology are so rapid and so important that an up-to-date text is essential to the student of pharmacology, both from the standpoint of actual information and as an aid in establishing a progressive and forward-looking viewpoint on the subject. For this reason, this newest edition is heartily recommended.

—*RUSSELL L. TAYLOR, Comdr. (MSC) USN*

COUGH SYNCOPE, by *Vincent J. Derbes*, M. D., F. A. C. P. and *Andrew Kerr, Jr.*, M. D. 182 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $4.75.

The heretofore obscure entity of cough syncope is discussed in an erudite manner by the authors of this book. The syndrome is defined very clearly in order to clear up some of the confusion that has existed in the past. The history of this syndrome is traced carefully, and the symptomatology, related conditions, theories of mechanism, and the physicologic mechanisms involved are covered completely. The weakest parts of the book, in my opinion, are the sections on treatment and medicolegal aspects. This is understandable when one realizes how little absolute proof exists as to the exact cause and mechanism of this syndrome. There are 36 case reports presented and discussed. The authors stress what they call "the terrain" for development of cough syncope. This means that these patients usually are male, obese, emphysematous or asthmatic, and fond of tobacco and alcoholic beverages. The entire text is well documented and the bibliography seems complete. I would recommend this book to internists, chest physicians, and those interested in geriatrics.—*E. P. MC LARNEY, Capt. (MC) USN*

ESSENTIALS OF CHEMISTRY, by *Gretchen O. Luros*, M. A. 6th edition. 544 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955, and LABORATORY EXPERIENCES IN CHEMISTRY, by *Gretchen O. Luros*, M. A. 6th edition. 184 pages; 6 illustrations. Designed to be used in Conjunction with sixth edition of "Essentials of Chemistry." J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $4.75; 1.75, respectively.

This set of two books written in a simple and readily understandable manner is designed specifically for use by young people entering the nursing profession. Its avowed aim is to assist the nurse in obtaining,

through a study of chemistry, a new understanding and appreciation of our environment so that a better foundation may be laid for the study of other fields: physiology, microbiology, pharmacology, nutrition, and the nursing arts.

The first eight units of the text concern fundamental principles of inorganic chemistry, such as the composition of matter, valence, oxidation-reduction, solutions, ionization, and radioactivity. The meaning, interpretation, and applications of chemical facts to nursing procedures are discussed in a simple, progressive manner.

The two units on organic chemistry are designed to give the student a clear conception of the structure, properties, and functioning of the various organic compounds as they relate to metabolism and other phases of biochemistry.

The last 11 units deal with biochemistry and are concerned with discussions of the major foods and their use by the body. The nature and physiologic effects of vitamins and hormones are admirably covered.

The text itself is accompanied and supplemented by a laboratory manual providing a total of 93 illustrative exercises that seek to develop skills and understanding. The two books together comprise a set that is recommended as a valuable aid in teaching beginning students the fundamentals of chemistry. — *WILLIAM L. AUSTIN, Maj., MSC, USA*

BASIC NURSING, Revised by the Teaching Staff of the Household Nursing Association, Boston, Mass., and edited by *Helen Z. Gill*, R. N. 4th edition. 749 pages; illustrated. The Macmillan Co., New York, N. Y., 1955.

This book can serve as an excellent handbook for the practical nursing student and practitioner. Its coverage is comprehensive, and it is presented in a clear, concise style.

Emphasis is placed on the role of the practical nurse in the care of the chronic and subacutely ill patient. In practice, this area is often delegated to the practical nurse; however, it is recognized that this area in nursing is one that demands understanding, knowledge, and appreciation of the sociopsychologic factors if comprehensive nursing care is to be given to these patients. Thus, it seems an injustice to the practical nurse to set forth, as one of her major roles, the nursing care of the chronic and subacutely ill patient, when her limited technical training does not prepare her to meet its demands.

Caring for the patient as an individual is emphasized. Consideration for each patient's personal likes and dislikes, his financial limitations, his national courtesies and customs, and his religious beliefs and rules are brought out.

Not only will the practical nursing student and the practitioner find this book to be a handy reference, but instructors in practical nursing may find that they can use it as a check for their own course outlines.

—*OUIDA C. UPCHURCH, Lt. (NC) USN*

SYSTEMIC ASSOCIATIONS AND TREATMENT OF SKIN DISEASES, By *Kurt Wiener*, M. D. 556 pages; 90 text illustrations. C. V. Mosby Co., St. Louis, Mo., 1955. Price $17.

In 1947 Dr. Wiener published his splendid work on skin manifestations of internal disorders. This newest volume deals with the systemic associations and therapy of skin disorders.

The book is well written and the material is presented in a manner that is pleasant and easy to read. The format, indexing, and presentation are excellent, and 2,759 references are quoted. It is very difficult to evaluate this work except to say that, as far as it goes, it is another good reference for the dermatologist. However, one cannot help asking whether this book was necessary. The reviewer would have preferred a revision of the 1947 work and its approach to the subject, with the inclusion of the important material in this volume. The resulting book might have been rather large, but it would have made a more complete reference valuable to more people. The author, nevertheless, seems to have succeeded well in the task to which he set himself.

—*LESLIE K. MacCLATCHIE, Capt. (MC) USN*

A PRIMER OF ELECTROCARDIOGRAPHY, by *George E. Burch*, M.D., F. A. C. P. and *Travis Winsor*, M. D., F. A. C. P. 3d edition, thoroughly revised. 286 pages; 281 illustrations. Lea & Febiger, Philadelphia, Pa., 1955. Price $5.

The third edition of this well-known book has not changed greatly from the previous edition. The book size and general form of presentation has remained unchanged, but the number of pages has been increased by 41 due to inclusion of some new material and increased spacing between the lines of type. Specifically, the number of lines per page has been decreased from 52 to 44, a welcome change which makes the book much easier to read.

The section on the electrocardiographic changes produced by electrolytes has been revised. The sections on unipolar limb leads, precordial leads, and ventricular gradient have been rewritten, and a new section on spatial vectocardiography has been added. There are 16 new illustrations.

There has been no change in the use of diagrams rather than photographs of actual electrocardiograms, a feature to which some cardiologists have expressed objection, but the authors believe that this is a superior method of presentation for beginners.

This book fulfills the purpose for which it was written, namely to serve as a primer for the student without prior knowledge of electrocardiography. The more advanced student and any physician who must make the final interpretation of electrocardiograms must have a greater knowledge of the subject than can be obtained from this book alone. However, it may well serve as a first step if it is supplemented by more detailed information from other sources.

—*SAMUEL H. SANDIFER, Lt. Col., MC, USA*

CARDIOVASCULAR SURGERY, Studies in Physiology, Diagnosis and Techniques. Proceedings of the International Symposium held at Henry Ford Hospital, Detroit, Mich., March, 1955. Edited by *Conrad R. Lam,* M. D. 543 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.

In this volume it is noteworthy that 60 participants and 17 discussants from nine countries, each an eminent authority in one or more of the fields dealing with cardiovascular problems, were given the opportunity to present in sufficient detail their findings and conclusions, based upon their laboratory investigations, observations, and clinical experiences.

In essence, studies in physiology, diagnosis, and technics as presently related to the problems of congenital heart disease, acquired heart disease, and surgery of the aorta and other major arteries comprise the entire published symposium.

One is impressed by the great amount of effort, study, and expenditure of funds that has been focused on most cardiovascular problems in the countries represented at this symposium. Dr. Crafoord and his associates (Swedish group) must be credited with doing the most outstanding work and leading the field in angiocardiographic diagnostic technics; illustrations and captions depicting their equipment, photographic methods, and conclusive diagnostic applications of such ingenious technics are without doubt one of the impressive features in the published volume.

When reviewing this book one is also impressed by the total absence of any mention or discussion of present thoughts regarding the problem or methods of revascularization of the myocardium damaged by coronary insufficiency—ample evidence that little has been accomplished in this highly important field, but which should no doubt come to the forefront in the not too distant future.

The presentation of the recent developments in the operative treatment of heretofore untouchable and difficult congenital heart problems, most specifically interventricular septal defects, by Dr. Lillehei and his group from the University of Minnesota, who employ cross-circulation technics, is another highlight of the volume. Their present endeavors to perfect a mechanical oxygenator to eliminate the direct donor seem even more promising.

The chapter on hypothermia will be of much interest to all cardiovascular surgeons who have the facilities and inclination to employ this important anesthetic adjuvant. The present technics employed clinically in this country, England, Canada, and France are discussed in considerable detail; the hazards and limitations, as well as advantages and methods presently known for minimizing complications and managing untoward events, are presented.

It is conceded that some of the concepts in this symposium will not long survive; nevertheless, such controversial viewpoints pertaining to diagnosis, pathophysiology, and rapidly changing technics will, in

many instances, serve as provocative impetus to better and more complete understanding of some of the highly complex problems in this rapidly changing field.

This book should be read by, and serve as a constant reference for, all who do cardiovascular research and especially for the cardiologist and cardiovascular surgeon. The volume should be included in the personal library of such specialists and is highly recommended for all professional reference libraries. —*JOHN M. SALYER, Col., MC, USA*

PROBLEMS IN AMOEBIASIS, by *Charles William Rees,* Ph. D. 119 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $4.75.

In this new, practical book on amebiasis, Dr. Rees systematically reviews his own voluminous research and presents an evaluation of current concepts concerning the participation of bacteria as pathogens in amebiasis. The investigator interested in experimental amebiasis will find this book useful as an up-to-date review of the literature and as a guide for the selection of appropriate tools and technics applicable to both *in vivo* and *in vitro* studies.

Because of the fastidiousness of this parasite, the development of various culture media is traced and the relative usefulness of "crude" and "monoxenic" cultures is considered. The "crude" cultures contain many species of bacteria growing with the amebae, and the "monoxenic" cultures contain a single select species of bacteria, trypanosomes, or embryonic tissues. Technics for the preparation of the latter type are discussed and evaluated. Certain technics for the concentration of parasites may not find as wide acceptance as this book indicates by the amount of space alloted (*i. e.,* an entire page for a drawing of a "Babcock" type tube). On the other hand the widely used Ritchie formalin-ether and the MIF technics are given relatively little consideration.

The final chapter contains clinical notes by C. A. Imboden on the etiology, pathology, clinical management, and therapy of amebiasis. The experienced investigator, on whose level the greater part of the book is written, may find that because of its brevity the clinical evaluation does not add appreciably to his knowledge of amebiasis. Nevertheless, Dr. Imboden has made an excellent, brief general review, and such observations as the dangers that beset the unwary in diagnosing this infection from proctoscopic material are well taken.

Dr. Rees has encompassed a subject about which many conflicting views exist, and he has fairly summarized these several schools of thought. In his words ". . . the basic problems of amoebiasis lie primarily in the fields of physiological chemistry, bacteriology, and clinical medicine," and he has outlined methods for approaching the problem from these various aspects. This book should be a definite asset to the laboratory worker interested in either specific or general aspects of amebiasis. —*DALE E. WYKOFF, Capt., MSC, USA*

New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

THE CYTOLOGY AND LIFE-HISTORY OF BACTERIA, by *K. A. Bisset*, D. Sc. 2d edition. 164 pages; illustrated. The Williams and Wilkins Co., Baltimore, Md., 1955. Price $6.

TOPLEY AND WILSON'S PRINCIPLES OF BACTERIOLOGY AND IMMUNITY. Volumes I and II. by *G. S. Wilson*, M. D., F. R. C. P., D. P. H. and *A. A. Miles*, C. B. E., M. A., M. D., F. R. C. P. 4th edition. 2,330 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1955. Price $24.50 for set of two volumes.

TEXTBOOK OF PHARMACEUTICAL COMPOUNDING AND DISPENSING, edited by *Rufus A. Lyman*, M. D., and *Joseph B. Sprowls*, Ph. D. Consulting Editor, *George Urdang*, Ph. G., D. Sc. Nat., SC. D. (h. c.). 2d edition. 477 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $9.75.

MEDICAL RESEARCH: A MIDCENTURY SURVEY. Two volumes. Volume I, American Medical Research: In Principle and Practice. Volume II, Unsolved Clinical Problems: In Biological Perspective. Published for the American Foundation, New York, N. Y. Chairman: *Curtis Bok*; Member-in charge: *Esther Everett Lape;* Committee of 26 Consultants. Volume I, 765 pages; Volume II, 740 pages. Little, Brown & Co., Boston, Mass., 1955. Price $15 for set of two volumes.

RECENT ADVANCES IN NEUROLOGY AND NEUROPSYCHIATRY, by Sir *Russell Brain*, Bt., D. M. (Oxon.), P. R. C. P. and *E. B. Strauss*, M. A., D. M. (Oxon.), D. Sc., F. R. C. P. with the assistance of *Denis Hill*, M. B., F. R. C. P., D. P. M., *Douglas Northfield*, M. S., F. R. C. S. and *David Sutton*, M. D., M. R. C. P., F. F. R., D. M. R. D. 6th edition. 311 pages; 43 illustrations. Little, Brown & Co., Boston, Mass., 1955. Price $7.50.

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 63, Art. 3, Pages 319-432, November 7, 1955. Editor: *Roy Waldo Miner*. "Psychotherapy and Counseling." Conference Co-Chairmen: *Lawrence K. Frank* and *Rollo May*. Consulting Editor: *Rollo May*. 108 pages. The New York Academy of Sciences, New York, N. Y., 1955. Price $3.50.

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 61, Art. 4, Pages 737-1064, September 27, 1955. Editor: *Roy Waldo Miner*. "Biology of Poliomyelitis." Conference Chairman and Consulting Editor: *Karl Habel*. 328 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price $5.

PRINCIPLES OF PSYCHOANALYSIS, Their Application to the Neuroses, by *Herman Nunberg*, M. D. Foreword by *Sigmund Freud*. Translated by *Madlyn Kahr* and *Sidney Kahr*, M. D. 382 pages. International Universities Press, Inc., New York, N. Y., 1955. Price $7.50.

HYPNOTIC SUGGESTION, Its Role in Psychoneurotic and Psychosomatic Disorders. A Thesis, by *S. J. Van Pelt,* M. D. 95 pages; illustrated. Philosophical Library, New York, N. Y., 1956. Price $2.75.

A. M. A. SCIENTIFIC EXHIBITS 1955. Sponsored by Council on Scientific Assembly, American Medical Association. 784 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price $20.

THE YEAR BOOK OF RADIOLOGY (1955-1956 Year Book Series). Part I: Radiologic Diagnosis, edited by *John Floyd Holt,* M. D. and *Fred Jenner Hodges,* M. D. Part II: Radiation Therapy, edited by *Harold W. Jacox,* M. D. and *Morton M. Kligerman,* M. D. 413 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1955. Price $9.

ACCEPTED DENTAL REMEDIES 1956, revised by Council on Dental Therapeutics of the American Dental Association. 21st edition. 206 pages. American Dental Association, Chicago, Ill., 1956. Price $2.

CYBERNETICS, Circular Causal and Feedback Mechanisms in Biological and Social Systems. Transactions of the Tenth Conference, April 22, 23, and 24, 1953, Princeton, N. J. Edited by *Heinz Von Foerster.* Assistant Editors: *Margaret Mead* and *Hans Lukas Teuber.* Sponsored by the Josiah Macy, Jr. Foundation. Published by Josiah Macy, Jr. Foundation Publications, New York, N. Y., 1955. Price $2.75.

PHYSIOLOGY AND PATHOLOGY OF INFANT NUTRITION, by *L. F. Meyer,* M. D. and *Erich Nassau,* M. D. Translated by *Kurt Glaser,* M. D., M. S., F. A. A. P. and *Susanne Glaser,* B. A. 533 pages; illustrated. 2d edition, revised. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $11.50.

THE DYNAMIC EQUILIBRIUM OF BODY PROTEINS, Hemoglobin, Plasma Proteins, Organ and Tissue Proteins, by *George H. Whipple,* M. D. 68 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $3.25.

PLANNING NEW INSTITUTIONAL FACILITIES FOR LONG-TERM CARE, by *Edna E. Nicholson.* Forewords by *Leonard A. Scheele,* M. D., *Edwin Crosby,* M. D., *G. Warfield Hobbs, III,* and *Edwin B. Morris, Jr.* 358 pages. G. P. Putnam's Sons, New York, N. Y., 1956. Price $4.50.

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Preventive Medicine in World War II. Volume III: Personal Health Measures and Immunization. 394 pages; illustrated. Prepared in the Historical Unit, Army Medical Service. Editor-in-Chief, Colonel *John Boyd Coates, Jr.,* MC. Editor for Preventive Medicine, *Ebbe Curtis Hoff,* Ph. D., M. D. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $3.25.

BRAIN MECHANISMS AND CONSCIOUSNESS, A Symposium organized by The Council for International Organizations of Medical Sciences. Established under the joint auspices of UNESCO and WHO. Consulting Editors: *Edgar D. Adrian* (UK), *Frederic Bremer* (Belgium), and *Herbert H. Jasper* (Canada). Editor for the Council: *J. F. Delafresnaye,* C. I. O. M. S., Paris, France. 556 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1954. Price $8.50.

CHEST X-RAY DIAGNOSIS, by *Max Ritvo,* M. D. 2d edition, thoroughly revised. 640 pages; 633 illustrations on 426 engravings and 1 color plate. Lea & Febiger, Philadelphia, Pa., 1956. Price $16.

ARTHROPLASTY, by *St. J. D. Buxton,* M. B., F. R. C. S. 126 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $6.

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. United States Army Dental Service in World War II, by *George F. Jeffcott*, Colonel, DC, USA. 362 pages; illustrated. Prepared in the Historical Unit, Army Medical Service. Editor-in-Chief, Colonel *John Boyd Coates, Jr.*, MC, USA. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $3.25.

THE MEDICAL DEPARTMENT, UNITED STATES ARMY. Surgery in World War II. The Physiologic Effects of Wounds, by The Board for the Study of the Severely Wounded, North African-Mediterranean Theater of Operations. 376 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, under the direction of Colonel *Joseph H. McNinch*, MC, USA. Office of the Surgeon General, Department of the Army, Washington, D. C., 1952. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $3.50.

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